Force and Motion

UNIT ONE

Lesson of the unit :

Mass and Weight.

Unit Objectives : By the end of this unit, you will be able to :

- Identify the concept of mass.
- Know how to measure the mass of some objects using the balance scale.
- Identify the concept of weight.
- Determine the weights of some objects using the spring scale.
- Know the factors affecting weight.
- Calculate the weight of objects on the Earth's surface and on the moon's surface.
- Compare between mass and weight.

The Lesson

Mass and Weight

- Mass and weight are two terms you often hear in your daily life.
- The confusion between mass and weight is considered one of the most common mistakes in our daily life.



SO, what is the difference between mass and weight ?

To know the answer to this question, we must study :

*First : **Mass*** *Second : **Weight***

First Mass

Observe the following pictures to discover the concept of mass :



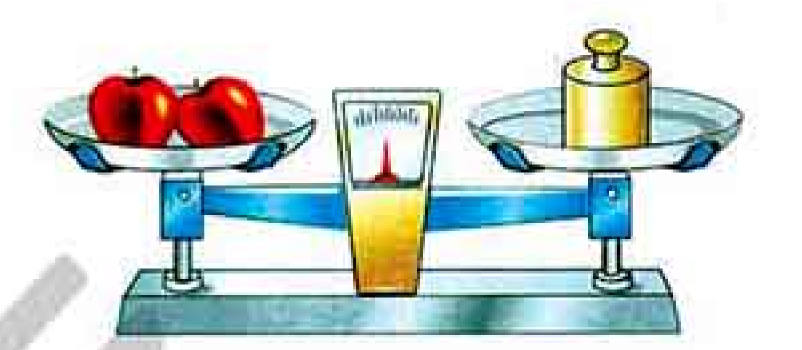


As you see, the mass of two apples is not equal to the mass of three apples, because they have different amounts of matter.

mass	الكتلة	weight	الوزن
concept	مفهوم	confusion	الخلط



The Lesson




But, the mass of two apples is equal to the mass of the searchlight, because both of them have two equal amounts of matter.

From the previous examples, we conclude that :

Mass

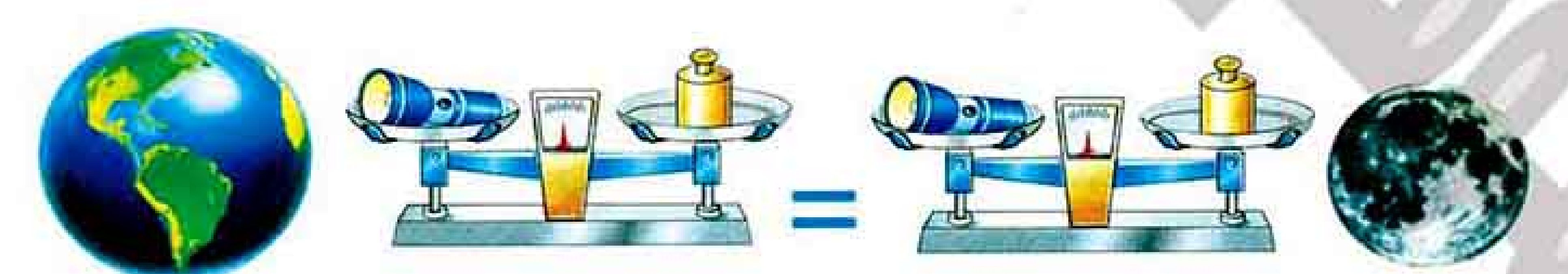
It is the amount of matter in an object.

The properties of mass :

1. All matter have mass whatever their physical states (solids, liquids or gases).
2. The mass of an object increases when the amount of matter in it increases and vice versa.
3. The mass of any matter is a fixed (stable) value and it does not change by changing the place of matter (on the Earth's surface, on the moon's surface, ... etc.).

Example :

By measuring the mass of an object on the Earth's surface, then measure the mass of the same object on the moon's surface, we will notice that its mass is not changed.



The object's mass on the Earth's surface is 250 gm.

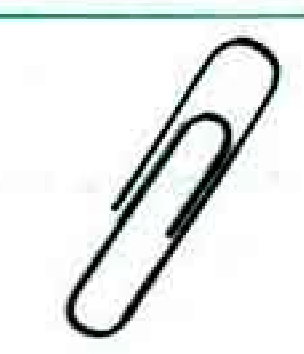
The object's mass on the moon's surface is 250 gm.

amount	كمية	physical states	الحالات الفيزيائية	vice versa	العكس
fixed value	قيمة ثابتة	searchlight	كشاف		

The measuring units of mass :

- Mass is measured in gram (gm.) or kilogram (kg.).

Gram (gm.) :
- It may be equal to the mass of one paper clip.
- It is suitable for measuring small masses such as jewellery.


The mass of one paper clip = 1 gm.

Kilogram (kg.) :
- It is equal to the mass of one liter of distilled water at the normal temperature.
- It is suitable for measuring large masses as fruits and vegetables.


The mass of one liter of distilled water = 1 kg.


Note
1 Kilogram = 1000 grams.

The measuring devices of mass :

- Mass is measured by different types of scales.



Types of scales are

Two-arms scale such as
- Balance scale
- Sensitive two-arms scale

One-arm scale such as
- One-arm digital scale.
- One-arm scale with pointer.






paper clip	دبوس ورق	sensitive scale	ميزان حساس	jewellery	مجوهرات
distilled water	ماء مقطر	measuring units	وحدات القياس	pointer	مؤشر
devices	أجهزة	digital scale	ميزان رقمى		


The Lesson




Notes

1. The balance scale is used to measure large masses as cheese, vegetables, ...etc.
2. The sensitive two-arms scale is used to measure small masses as gold and chemicals.

Activity 1 To know how to measure the mass of a solid object by using a balance scale :

Tools:

A balance scale – standard masses – the object that we need to measure its mass.

Steps:

1. Put a clean balance scale horizontally on a stable shelf **G.R.**
   To avoid any vibration of the balance scale.
2. Put the object on one of the two arms and the standard masses on the other arm until the two arms balance.
3. Add up the written numbers on the standard masses together.



Conclusion:

The mass of any solid object is equal to the total mass of the standard masses which balance with the object.




Note

On adding the mass of the standard masses, we must be sure that they are similar in the unit.

horizontally	أفقيًا	add up	يجمع	standard masses	كُتل قياسية (موازين)
vibration	اهتزاز	chemicals	المواد الكيميائية		





Activity 2 To know how do you measure the mass of a liquid by using a digital scale :

Tools:

A digital scale – a clean glass – an amount of water.

Steps:



digital scale



1. Put the clean digital scale horizontally on a stable shelf.
2. Bring an empty glass and record its mass by using the digital scale (M_1 = 100 gm.).
3. Put the amount of water that is needed to be measured in the glass, then record the total mass (M_2 = 180 gm.).
4. Subtract M_1 from M_2 to obtain the mass of water.

Conclusion:

The mass of the liquid = The mass of the glass with liquid (M_2)
– the mass of the empty glass (M_1).

Mass of liquid = $M_2 - M_1$ = 180 – 100 = 80 gm.

Enrichment information

- There is a relation between mass and motion.
  Where, by increasing the object's mass, it is more difficult to change its speed.

Example :

A train has a bigger mass than the car, so a train needs a stronger force to stop than that needed for the car.



Exercise

Complete the following sentences :

1. .... is the amount of matter in an object.

2. 500 grams = ... kilogram.

3. The measuring units of mass are .... and ....



The Lesson

Second Weight

Observe the following pictures to discover the concept of weight :





The children fall down when they jump up on the Earth's surface, but the astronaut doesn't fall down when he jumps from a high position in space. Why ?





If you let a ball free from your hand, it will fall down to the Earth's surface, while objects in the space don't fall down, but swim in space. Why ?

From all the previous pictures, we can conclude that :

- The reason for object's fall downwards the Earth, is a type of force called weight (gravitational force).
- You can feel this force when you carry an object or try lifting it.

Weight

It is the force by which a body is attracted to the Earth.

OR : It is the gravitational force by which a body is attracted to the Earth.

attract	ينجذب	force	قوة	gravitational force	قوة الجاذبية الأرضية
astronaut	رائد فضاء	lifting	رفع		





1. The effect of weight is always directed towards the center of the Earth.
2. On the Earth, all objects have weight, but in space, all objects are in a state of weightlessness.

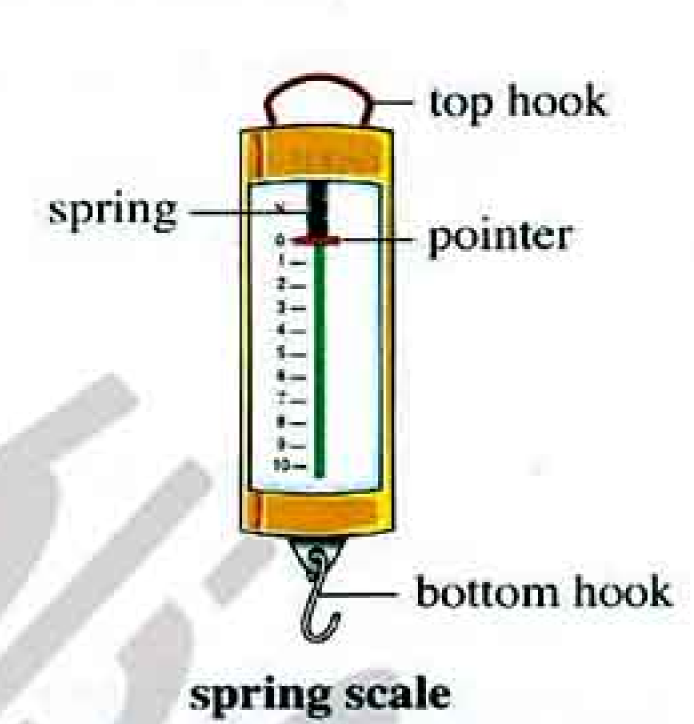
The measuring unit of weight :

Weight is measured in a unit called Newton.

Newton

It is the measuring unit of weight which is almost equal to the weight of an object on the Earth's surface whose mass is 100 grams.

The measuring device of weight :



spring scale

- The weight of any object can be measured by the spring scale.
- The spring scale consists of :
  1. Top hook (to hold the scale).
  2. Bottom hook (to hang the object up the scale).
  3. A spring with a pointer.

Exercise

Write the scientific term :

1. *The measuring unit of weight.* (..............)
2. *The gravitational force by which a body is attracted to the Earth.* (..............)
3. *A device which is used to measure the weight of an object.* (..............)

Complete the following sentences :

1. *One Newton is equal to the weight of an object on the Earth whose mass is .... grams.*
2. *Weight always affects toward the .... of the Earth.*

weightlessness	انعدام الوزن	spring scale	ميزان زنبركى	hook	خُطّاف
hang	يُعَلِّق				



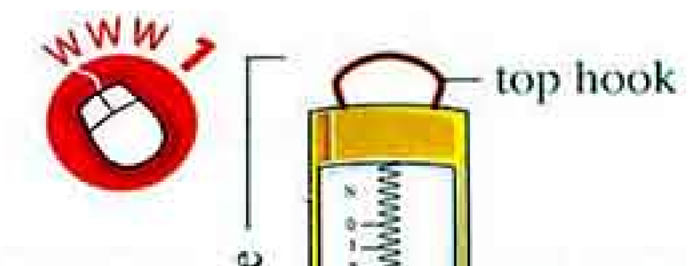


The Lesson

Activity 3 To know how you can measure the weight of any object by using the spring scale :

Tools:

A spring scale – an object (a can).



Steps:

1. Hold the spring scale from its top hook, then hang the can in its bottom hook.
2. Let the object go down slowly.

Observation:

The can pulls the spring downwards and the reading of the pointer increases.

3. Wait until the object becomes stable to record the reading, which refers to the object's weight.

Conclusion:

The weight of any object can be measured by the spring scale by determining the extension of its spring.

The factors affecting weight :

The weight of any object is affected by three factors which are :

1. **The object's mass.**
2. **The planet (place) where the object exists.**
3. **The distance between the object and the centre of the planet.**

refer to	يشير إلى	determining	تعيين	extension	التمدُد
exist	يوجَد	factors	العوامل		





1 The object's mass :

Activity 4 To discover the relation between mass and weight.

Tools:

A balance scale – a spring scale – different objects with different masses.





Steps:

1. Measure the mass of the first object by using the balance scale and its weight by the spring scale.
2. Repeat the previous step with the other objects and write the results in the following table.

Observation:

You will observe the following results :

The object's mass (kg.)	1	2	5	6	8
The object's weight (Newton)	10	20	50	60	80

Conclusion:

As the object's mass increases, its weight increases.



Notes

1. You can calculate the weight of an object on the Earth's surface according to the following role :

   Object's weight on the Earth's surface (Newton) = Its mass (kg.) × 10

2. The acceleration of the Earth gravity equals 10 m/sec^2.

role قاعدة acceleration تسارع





Problems

1. The mass of a person is equal to 70 kg., calculate its weight on the Earth's surface.

Solution:

The object's weight on the Earth's surface = its mass (kg) × 10

= 70 × 10 = 700 Newton.

2. Calculate the weight of an object on the Earth's surface. If you know that its mass is equal to 500 gm.

Solution:

The object's mass = 500 gm ÷ 1000 = $\frac{1}{2}$ kg.

The object's weight on the Earth's surface = its mass (kg) × 10

= $\frac{1}{2}$ × 10 = 5 Newton.

3. If the weight of an object on the Earth's surface is equal to 300 Newton. Calculate the mass of this object.

Solution:

The object's weight on the Earth's surface = its mass (kg) × 10

300 = its mass (kg) × 10

It mass = $\frac{300}{10}$ = 30 kg.



Exercise

1. Calculate the weight of an object on the Earth's surface whose mass equals 5 kilograms.

....

....

2. Complete the following sentences :

a. Mass is measured by .... scale, whereas weight is measured by .... scale.

b. The factors that affect the weight of the body are .... , ... and the distance between the object and the center of the planet.

c. The object's weight on the Earth = ... × ....

d. Weight is measured in .... unit, while mass is measured in .... or .... units.

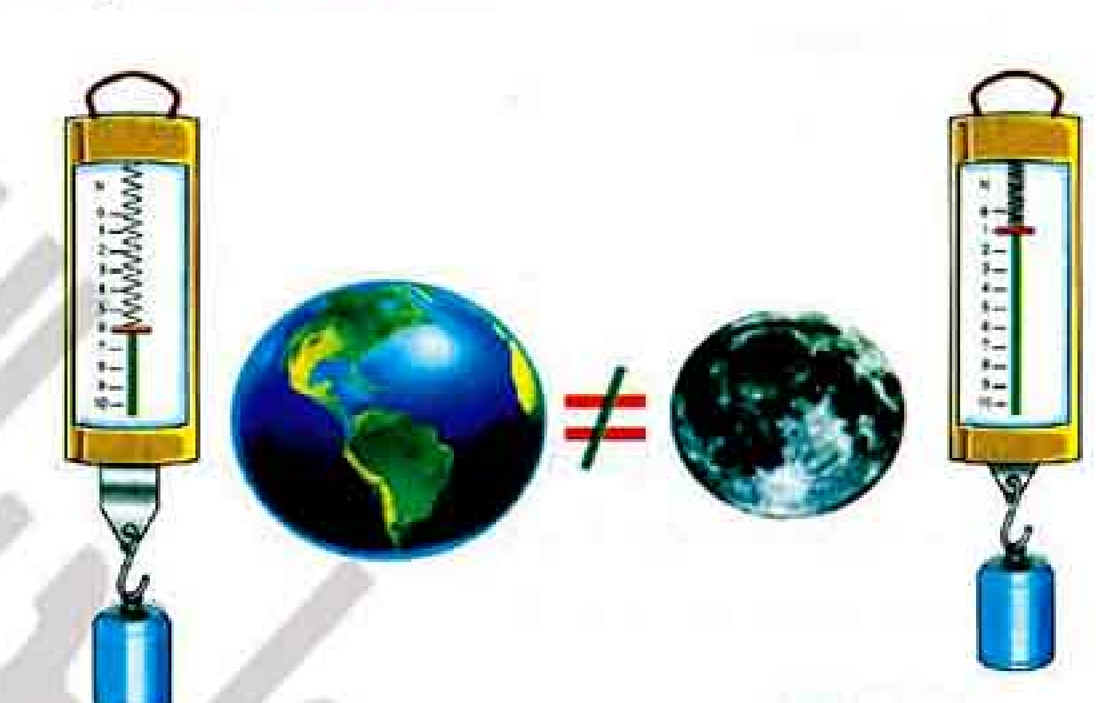


2 The planet where the object exists :

- The weight of an object differs according to the planet (or the moon) where the object exists.
- As the mass of the planet increases, its gravitational force for an object increases, so the weight of the object increases.

Example :

On measuring the weight of an object on the Earth's surface, then measure the weight of the same object on the moon's surface, we notice that its weight changes.



The object's weight on the Earth's surface equals 6 Newton.

The object's weight on the moon's surface equals 1 Newton.

Where,

the weight of the object on the moon's surface equals one sixths $\left(\frac{1}{6}\right)$ of its weight on the Earth's surface. G.R.

Because the Earth has greater mass than the moon, so the gravitational force of the Earth is greater than the moon.

Note

- You can calculate the weight of an object on the moon's surface according to the following role :

Object's weight on the moon's surface (Newton) $= \frac{1}{6} \times$ *its weight on the Earth.*

$$\text{Or} = \frac{\text{Its mass (kg.)} \times 10}{6}$$



Problem

1. If the mass of an object on the Earth's surface equals 60 kg., calculate:

1. Its mass on the moon's surface.

2. Its weight on the Earth's surface.

3. Its weight on the moon's surface.

Solution:

1. The object's mass on the moon = 60 kg.

2. The object's weight on the Earth = Its mass (kg.) × 10 = 60 × 10 = 600 Newton.

3. The object's weight on the moon = $\frac{1}{6}$ × its weight on the Earth

= $\frac{1}{6}$ × 600 = 100 Newton

2. A body whose weight is 20 Newton on the moon surface. Calculate :

a. Its weight on the Earth's surface.

b. Its mass on the Earth's surface.

Solution:

a. The weight of the body on moon = $\frac{1}{6}$ × its weight on the Earth.

20 = $\frac{1}{6}$ × its weight on the Earth.

The weight on the Earth = 20 × 6 = 120 Newton.

b. The object's weight on the Earth = its mass (kg) × 10

120 = its mass (kg) × 10

The mass of the object = $\frac{120}{10}$ = 12 kg.

3 The distance between the object and the center of the planet :

The weight of any body decreases when the distance between the body and the center of the planet increases as the gravitational force decreases.

Example :

The weight of a person in a flying balloon is smaller than that on the Earth's surface G.R.
Because the gravitational force of the Earth to the person in the balloon decreases as we go away from the center of the Earth.





The differences between mass and weight :

Points of comparison	Mass	Weight
Definition :	The amount of matter in an object.	The gravitational force by which the body is attracted to the Earth.
Measuring unit :	Kilogram or gram.	Newton.
Measuring device :	- Balance scale. - Sensitive two-arms scale. - One-arm digital scale. - One-arm scale with a pointer.	Spring scale.
The direction of its effect :	It has no direction.	Its effect is always directed towards the center of the Earth (downward).
The effect of changing the place :	Constant. (It does not change with changing the place).	Variable. (It changes with changing the place).

Try to answer :
* Test yourself 1

* General exercise of the school book on unit 1

* Model exams on unit 1

constant ثابت variable متغير

Remember



Mass :

- **It is the amount of matter in an object.**
- It doesn't change with changing the place.
- The measuring units of mass are gram (gm.) or kilogram (kg.).
- 1 kilogram = 1000 grams.

Weight :

- **It is the force by which a body is attracted to the Earth.**
- It changes with changing the place and changes from a planet to another.
- The measuring unit of weight is Newton.
- **The factors affecting weight are :**
  1. The object's mass.
  2. The planet (place) where the object exists.
  3. The distance between the object and the center of the planet.
- Object's weight on the Earth's surface (in Newton)

  = Its mass (in kilogram) × 10
- Object's weight on the moon's surface (in Newton)

  $= \frac{1}{6} \times$ Its weight on the Earth

  or $= \frac{\text{Its mass (in kilogram)} \times 10}{6}$

Questions on the lesson

Questions signed by 📖 have been taken from the school book.

1. Choose the correct answer :

1. The amount of matter that the object contains is known as ....
   a. mass. b. weight. c. Newton. d. gram. *(Ismailia 2014)*
2. The measuring units of mass includes ....
   a. gram. b. kilogram.
   c. kilometer. d. (a) and (b).
3. .... nearly equals the mass of one paper clip.
   a. Kilogram b. Gram c. Newton d. Ton
4. .... is suitable for measuring large masses as fruits and vegetables.
   a. Kilogram b. Gram c. Kilometer d. Meter
5. .... equals the mass of one liter of distilled water at the normal temperature. *(Alex. 2017)*
   a. Kilometer b. Kilogram c. Gram d. Meter
6. The mass of half litre of water equals .... grams. *(Red Sea 2015)*
   a. 5 b. 50 c. 500 d. 5000
7. All the following scales are examples of scales that are used to measure mass only except ....
   a. balance scale. b. one-arm digital scale.
   c. spring scale. d. sensitive two-arms scale.
8. .... is the gravitational force by which a body is attracted to the Earth.
   a. Weight b. Mass c. Newton d. Balance scale
9. .... is the measuring unit of weight. *(El-Minia 2016)*
   a. Newton b. Meter c. Kilogram d. Gram
10. Newton equals the weight of an object whose mass is .... gram(s). *(Beheira & Kafr El-Sheikh 2017)*
    a. 1 b. 10 c. 100 d. 1000
11. 📖 The device of measuring weight is .... *(Menofia & Damietta 2017)*
    a. the spring scale. b. the balance scale.
    c. one-arm scale. d. two-arms scale.



The Lesson

12. The weight of any body = ... *(Aswan 2016)*

a. its mass b. its mass x 100 c. its mass x 10 d. $\frac{\text{its mass}}{100}$

13. An object whose weight is 20 Newton on Earth, so its mass equals .... *(Beni-Suef & South Sinai 2017)*

a. 10 kg. b. 2 kg. c. 200 kg. d. 20 kg.

14. The weight of any object .... by increasing its mass.

a. decreases b. increases
c. still constant d. no correct answer

15. .... is (are) the factors affecting weight.

a. The object's mass b. The planet where object exists
c. The distance between the object and the center of the planet
d. (a) , (b) and (c)

16. The weight of an object on the .... planet equals 6 times its weight on the moon's surface. *(Assiut 2017)*

a. Mars b. Earth c. Jupiter d. Neptune

17. The weight of any object .... when the distance between the body and the center of the Earth increases. *(Giza 2016)*

a. increases b. decreases c. still constant d. (a) and (b)

18. Your weight on the Earth's surface is 600 Newton, so your weight on the moon's surface is .... Newton. *(Dakhlia & Suez 2017)*

a. 6 b. 60 c. 100 d. 10

19. An object's mass on the Earth's surface is 6 kg. so, its weight on the moon's surface is .... *(Kalyoubia & Matrouh 2017)*

a. 6 kg. b. 6 Newton. c. 60 Newton. d. 10 Newton.

20. The mass of a body on the moon's surface is 10 kg., so its mass on the Earth's surface equals .... *(Sohag 2017)*

a. 10 Newton. b. 10 kg. c. 60 kg. d. 60 Newton.

21. The weight of a human in a balloon away from the Earth's surface will not be equal to his weight on the Earth's surface due to the .... of the effect of Earth's gravitational force. *(Port Said 2017)*

a. decrease b. increase c. stability d. absence



22. The weight of a person in a balloon at certain height from the Earth's surface equals 70 Newtons, so his weight on the Earth's surface is .... *(Gharbia 2017)*
    a. 68 Newtons.   b. 69 Newtons.
    c. 70 Newtons.   d. 71 Newtons.

23. The gravitational force for an apple its mass is 200 gm. = ... Newtons. *(Giza 2017)*
    a. 2   b. 200   c. 2000   d. 20

2. Put (✓) in front of the right statements and (×) in front of the wrong statements, then correct the underlined words in the wrong ones :

1. Weight is the amount of matter in an object. ( )
2. The mass of a piece of stone on the Earth's surface is smaller than its mass on the moon's surface. *(Cairo 2014)* ( )
3. The weight is constant amount changes as the location changes. ( ) *(Giza & Fayoum 2017)*
4. Kilogram nearly equals the mass of one paper clip. ( )
5. Gram is used to measure big masses. ( )
6. Gram is suitable for measuring jewellery, while kilogram is suitable for measuring vegetables. ( )
7. Sensitive two-arms scale is used to measure small masses as gold and cheese. ( )
8. Digital scale is used for measuring weight of an object. *(Suez & Aswan 2017)* ( )
9. The mass of one litre of distilled water equals 100 grams. *(Red Sea 2016)* ( )
10. The mass of a body on the moon surface is one sixth ($\frac{1}{6}$) its mass on the Earth's surface. *(El-Minia & Giza 2016)* ( )
11. Weight is the gravitational force by which a body is attracted to the Earth. *(Dakahlia 2017)* ( )
12. The effect of weight is always directed towards the surface of the Earth. *(Menofia 2014)* ( )
13. Newton is the measuring unit of weight of an object whose mass is 100 grams. *(Luxor 2013)* ( )
14. When the mass of an object on Earth equals 2 kg., so its weight equals 200 Newton. *(Kafr El-Sheikh 2012)* ( )

15. The weight of any object can be measured by the balance scale. ( )
(Qena & Assiut 2016)

16. The extension of the wire of the spring scale equals the weight of the hanged object on it. ( )

17. By increasing the mass of the piece of stone, its weight decreases. ( )
(Damietta 2016)

18. When the mass of a toy car equals 1 kilogram, so its weight equals 300 Newton. (Damietta 2017) ( )

19. As the mass of the planet increases the weight of body on it decreases.
(Gharbia 2015) ( )

20. When your weight on the Earth's surface is 600 Newton, so your weight on the moon's surface is 6 Newton. (Giza 2012) ( )

21. The Earth gravitational force increases as the body moves away from the Earth. (Menofia 2017) ( )

3. Write the scientific term of each of the following statements :

1. The amount of matter in an object. (Cairo & Dakahlia 2017) (……………)
2. The measuring unit of mass which is suitable for measuring the small masses as jewellery. (……………)
3. The measuring unit of mass which equals the mass of one liter of distilled water at the normal temperature. (Cairo 2015) (……………)
4. A device used to measure the mass of objects. (Alex. 2016) (……………)
5. A type of scales that is used to measure the large masses as cheese and fruits. (……………)
6. The measuring unit of mass which suitable for measuring the large masses. (……………)
7. A type of scales that is used to measure gold and chemicals. (……………)
(Beheira 2013)
8. The force with which a body is attracted to the Earth. (Giza 2017) (……………)
9. The attraction force of the Earth to the body. (Fayoum 2017) (……………)
10. The measuring unit of weight that is almost equal to the weight of an object whose mass is 100 grams. (Menofia 2017) (……………)
11. The measuring device of weight. (Sohag 2017) (……………)

12. Mass (kg) × 10 (...............)
13. Weight / 10 (...............)

4. Complete the following statements :

1. .... is the amount of matter in an object.
2. The mass of an object .... when the amount of matter increases in it.
3. Mass is a constant value and it is not affected by changing .... *(Aswan 2017)*
4. .... and .... are measuring units of mass. *(Dakahlia 2015)*
5. .... equals the mass of one liter of distilled water at the normal temperature.
6. Gram is suitable for measuring small masses as .... , while .... is suitable for measuring large masses as ....
7. Mass is measured by different types of scales as .... and .... *(Giza & El-Minia 2017)*
8. .... and .... are from the types of the two-arms scales.
9. .... scale is used to measure the large masses as cheese and vegetables, while.......... scale is used to measure small masses.
10. One-arm scales are divided into .... and ....
11. Mass is the amount of matter that body contains and it does not change according to .... *(Suez 2017)*
12. The effect of weight is always directed towards ....
13. The objects seem weightless in the space due to the absence of ....
14. The measuring unit of mass is .... or .... whereas the measuring unit of weight is .... *(Cairo & Fayoum 2017)*
15. Weight of the body is measured in .... unit and .... scale is used to measure it. *(Cairo 2016)*
16. Mass is measured by .... scale, whereas weight is measured by .... scale. *(Alex. & Gharbia 2017)*
17. An object's weight depends on .... , ... and .... *(Alex. 2016)*
18. By increasing the mass of any object, its weight ....
19. Mass of any object = $\frac{..........}{10}$



20. The gravitational force by which a body is attracted to the Earth is called .... and it increases as the .... of the planet increases. *(Suez 2015)*

21. The weight of an object on the moon's surface equals .... of its weight on the Earth's surface. *(Giza 2017)*

22. The gravitational force for a balloon .... when the distance between the balloon and the center of the Earth decreases.

23. An object's weight is affected by the distance being away from the .... of the planet. *(Port Said 2016)*

24. As the mass of the planet increases, the weight of an object exists on this planet will ...., because the gravitational force of this planet .... *(Alex. & Sharkia 2017)*

25. The mass of a body on Earth is .... , whereas its weight on Earth is .... *(Cairo 2012)*

26. The balance scale is used to measure .... , while the spring scale is used to measure .... *(Beni-Suef 2017)*

27. The object's mass on the moon's surface .... its mass on the Earth's surface. *(Cairo 2013)*

5. Give reasons for the following :

1. The mass of a body on the Earth's surface equals the mass of the same body on the moon's surface. *(Beheira 2016)*

   ....

   ....

2. Object's fall downward Earth. *(Red Sea 2016)*

   ....

3. The balance scale should be placed horizontally on a stable shelf. *(Port Said 2013)*

   ....

4. The force of the moon's gravity is less than the Earth's gravity. *(Luxor 2016)*

   ....

   ....



5. The weight of a person on the Earth's surface is larger than that on the moon's surface. *(Red Sea 2017)*

6. The weight of a body in a flying balloon is smaller than that on Earth's surface. *(Alex. 2012)*

7. The weight of an object changes according to the planet that the object exists on it. *(Damietta 2017)*

8. The wire of spring scale expands when a body is hanged to it.

6. What is meant by ...?

1. Mass.

2. Gram.

3. Kilogram.

4. Weight.

5. Newton.

6. The mass of one small watermellon is 500 grams. *(Damietta 2011)*

7. The weight of a body equals 1 Newton. *(Kalyoubia 2012)*

8. The weight of an object on the moon's surface equals one sixths of its weight on the Earth's surface.

The Lesson

7. What happens when ...?

1. You hang a body in the bottom hook of the spring scale.

....

2. The mass of an object increases.

....

3. The mass of the planet where the object exists increases.

....

4. The mass of an object decreases to a half.

....

5. There is no gravity on the Earth's surface. *(Qena 2016)*

....

6. You measure the weight of a toy car on the Earth's surface, then measure its weight on the moon's surface. *(Sharkia 2016)*

....

....

7. The distance between a person in a balloon and the center of Earth increases. *(Dakahlia 2016)*

....

8. Transfering a body of 60 Newtons weight from the Earth's surface to the moon's surface. *(Alex. 2016)*

....

8. What is the importance of each of the following ?

1. Earth gravity.

....

2. Balance scale. *(Port Said 2017)*

....

3. Sensitive two-arms scale.

....

4. Spring scale. *(Cairo & Kalyoubia 2017)*

....

5. One - arm scale. *(Cairo & South Sinai 2016)*

....

9. **Compare between mass and weight.** *(Kalyoubia & Beheira 2017)*

....

....

....

....

10. **Mention the differences between the balance scale and the spring scale.**

....

....

....

11. **Mention the factors affecting weight.** *(Sharkia 2013)*

....

....

....

12. **Problems :**

1. An object's mass = 30 kg. on the Earth's surface, calculate its weight on the Earth's surface. *(Suez 2017)*

....

....

2. An object whose mass on Earth equals 6 kg. calculate its weight on both surfaces of the Earth and the moon. *(Sharkia & Sohag 2017)*

....

....

....

3. The opposite pictures illustrate the steps of calculating the mass of a liquid using the digital scale. Look at the following pictures, then calculate the mass and the weight of this liquid.

119.76 g

186.73 g

....

....

....

4. Calculate the weight of an object on the moon's surface, where its weight on the Earth's surface is 6 Newton. *(El-Minia 2014)*

....

....

5. If the object's mass = 30 kg on the Earth. **Calculate :** *(Alex. & Gharbia 2017)*
   a. Its mass on the moon.
   b. Its weight on the Earth.
   c. Its weight on the moon.

....
....
....

6. A body whose weight is 20 Newton on the moon surface.
   Calculate : *(Menofia 2017)*
   a. Its weight on the Earth's surface.
   b. Its mass on the Earth's surface.

....
....
....

7. If an object's mass = 200 gm. on the Earth's surface. **Calculate :**
   a. Its mass on the moon.
   b. Its weight on the Earth. *(Ismailia 2017)*

....
....
....

8. If the weight of your body on the Earth's surface is 600 Newton.
   1. Calculate : *(New Valley 2017)*
   a. Your mass on the Earth's surface.
   b. Your mass on the moon's surface.
   c. Your weight on the moon's surface.
   2. Mention the measuring device for the weight.

....
....
....
....

13. The following table shows the relation between the object's mass and its weight :

The object's mass (kg.)	3	4	5	6
The object's weight (Newton)	30	40	50	60

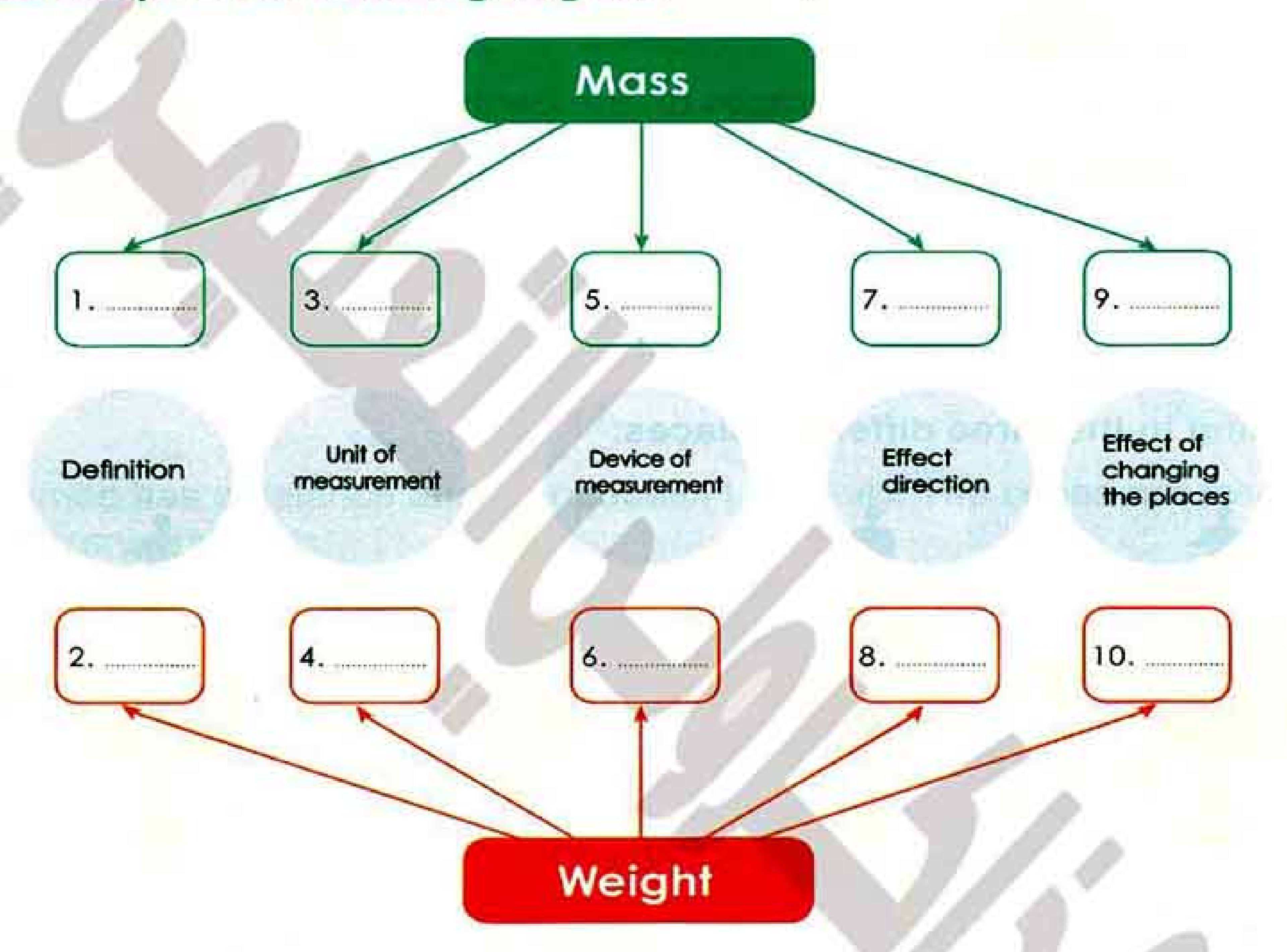
1. **Choose :** By increasing the mass of the object, its weight ....
   (increases – decreases – still constant)



2. Write the law that indicates the relation between mass and weight.

....

14. Complete the following diagram.



15. Choose from column (A) what suits it in column (B) :

(A)	(B)
1. Newton	a. The gravitational force for an object.
2. Mass	b. The measuring unit of mass.
3. Kilogram	c. The measuring unit of weight.
4. Weight	d. The amount of matter in an object.
5. Spring scale	e. Is the measuring device of weight.

1. .... 2. .... 3. .... 4. .... 5. ....



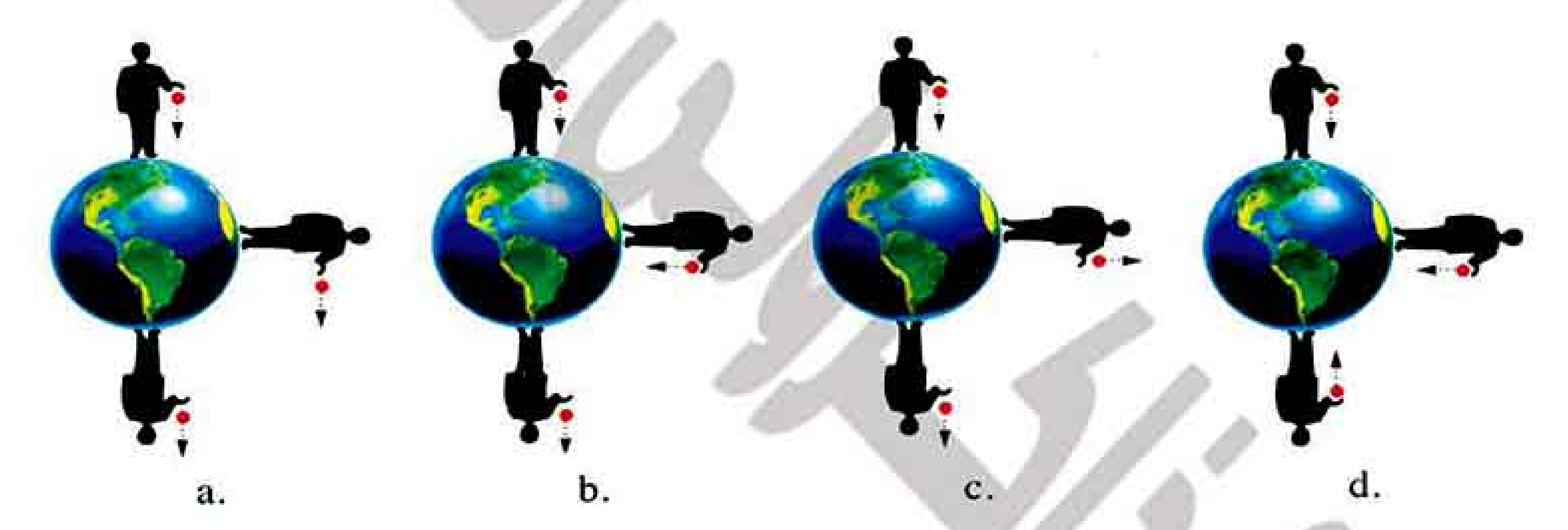
Timss Questions

1. The opposite figure shows a person carrying a ball is standing in three different places on the Earth.

If this person drops the ball, the gravity makes it fall down.



Which of the following figures shows the right directions of the ball falling in the three different places:



2. Choose the correct answer :

1. Ahmed weighs 850 Newtons on the Earth's surface, while his weight on the planet Venus is 765 Newtons.
   So, the mass of the planet Venus is .... the mass of the planet Earth.

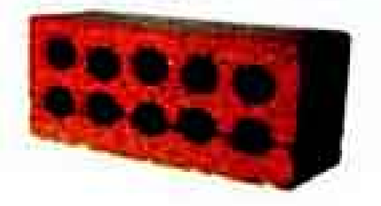
   a. more than   b. less than   c. equal to

2. Ramy weighs 750 Newtons (750 N) on Earth.
   On the planet Mars, the force of gravity is 38% of that on Earth.
   How much would Ramy weigh on Mars? ....

   a. 285 N.   b. 750 N.   c. 1250 N.

3. Ramy's teacher places three objects in front of him, as shown below. He puts them in order according to their volume.


An empty carton box


A brick


An apple

Ramy thinks that objects with more volume weigh more.

a. Do you agree with him ? Yes No

b. Explain your answer.

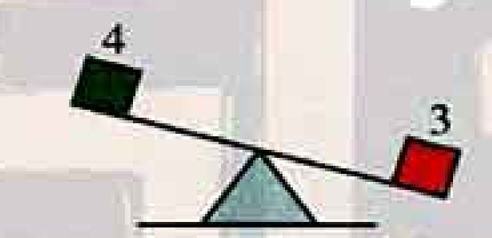
....

....

4. Ahmed has a balance and four cubes (1, 2, 3, 4). The cubes are made of different materials.
He puts two cubes at a time on the balance and observes the following results.



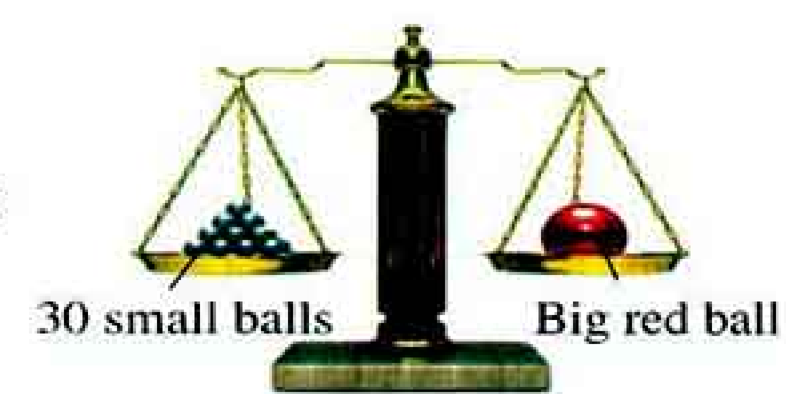




What can he conclude about the weight of cube ?

a. It is heavier than cubes 1,3 and 4.
b. It is heavier than cube 1 but lighter than cubes 3 and 4.
c. It is heavier than cube 3 but lighter than cubes 1 and 4.
d. It is heavier than cube 4 but lighter than cubes 1 and 3.

5. You have 30 similar small balls, made up of the same matter and also equal in volumes.
As in the opposite figure, the 30 small balls get balanced with a big red ball.
If you know that the weight of the big red ball equals 150 Newtons.



Calculate the weight and the mass of one small ball.

- The weight of one small ball = ...
- The mass of one small ball = ...

Thermal Energy

UNIT TWO

Lessons of the unit :

1. Heat conduction.
2. Measuring temperature.

Unit Objectives : By the end of this unit, you will be able to :

- Identify the concept of heat energy.
- Identify the concept of temperature.
- Determine some materials that are good conductors of heat or bad conductors of heat.
- Do some activities to show the various metals that conduct heat.
- Determine the usages of the good and the bad conductors of heat.
- Compare between the medical thermometer and Celsius thermometer in usages and structure.
- Appreciate the role of scientists in our life.

Lesson 1
Heat conduction

Heat is a form of energy that is important for many uses and purposes in our daily life such as :



Heat energy :

It is the form of energy that transfers from the higher temperature object to the lower temperature object.

1 Lesson

Examples :

1. When you hold a piece of ice in your hand, you feel cold. Why ?

Because the heat transfers from the higher temperature object (your hand) to the lower temperature object (the piece of ice).

2. When you hold a hot cup of tea in your hand, you feel hot. Why ?

Because the heat transfers from the higher temperature object (the cup of tea) to the lower temperature object (your hand).

- **But, what is meant by temperature ?**

Temperature :

It is the degree of hotness or coldness of a body.

- The measuring devices of temperature are called thermometers.

Materials and heat conduction :

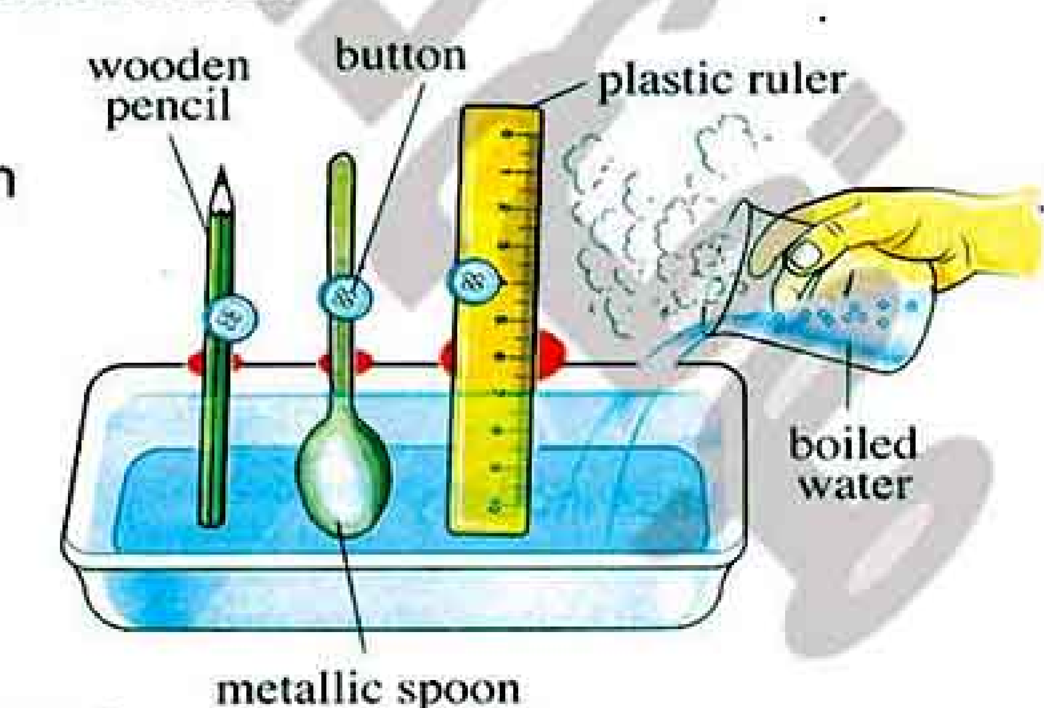
Activity 1 A : To show the ability of materials to conduct heat :

Tools:

A glass container – a metallic spoon – a plastic ruler – a wooden pencil – three buttons – molten wax – clay – boiled water.

Steps:

1. Stick a button on the ruler, the spoon and the pencil using molten wax, then fix them at the edge of the container using clay.
2. Pour boiled water in the container to be half filled.



Observation:

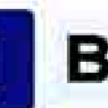
The button falls from the metallic spoon only.

degree	الدرجة	ability	قابلية	molten wax	شمع منصهر
button	زر	boiled water	ماء مغلى	clay	صلصال





Activity 1 B



Tools:

A beaker contains water – burner – 4 rods of different materials.

Steps:

1. Bring 4 rods nearly equal in length and thickness from wood, aluminium, plastic and iron.
2. Put the beaker containing water on the flame.
3. Put the 4 rods inside the hot water.
4. Touch the end of each rod with your finger.

Observations:

1. You feel hot when touching aluminium and iron rods.
2. You don't feel hot when touching wood and plastic rods.

General conclusion:

From the two previous activities, we can conclude that :
Materials are classified, according to their heat conductivity, into two types :
- Heat conductors (good conductors of heat).
- Heat insulators (bad conductors of heat).

Heat conductors :

They are the materials that let heat flow through.

Examples of heat conductors :

Iron, aluminium, copper, mercury and stainless steel.

Heat insulators :

They are the materials that do not let heat flow through.

Examples of heat insulators :

Wood, glass, plastic, paper, wool, rubber and air.

burner	موقد	heat conductors	موصلات للحرارة	heat insulators	مواد عازلة للحرارة
flow	يمر	mercury	الزئبق		





1 Lesson

G.R.

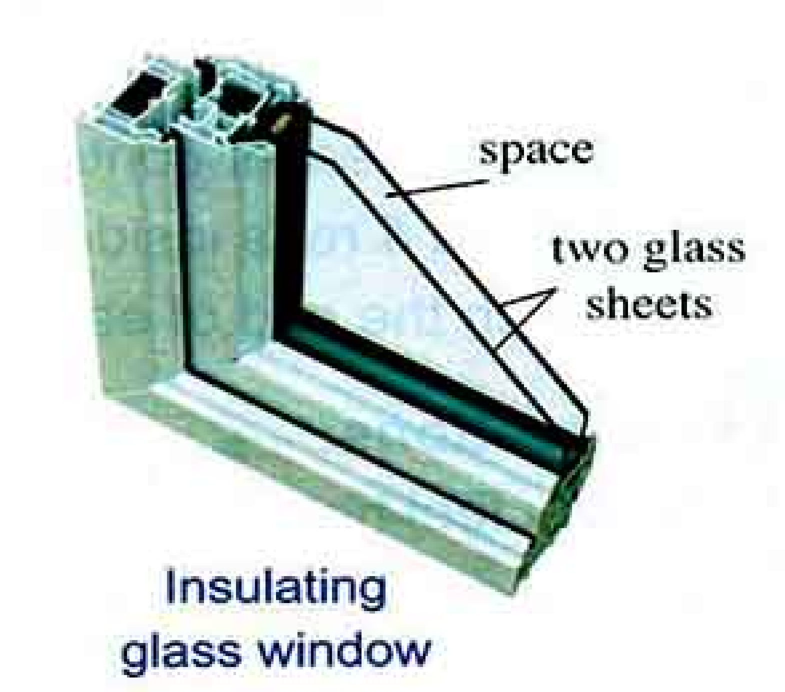
- **Wood is considered as a heat insulator.**
  Because it doesn't allow heat to flow through.
- **Copper is considered as a heat conductor.**
  Because it allows heat to flow through.

Life applications on heat insulators and heat conductors :

Heat insulators :

Air is used in making the insulating glass windows.

Where,
It is made up by bonding two glass sheets and leaving a space filled with air between them **to prevent the leakage of heat**.



Insulating glass window

Heat conductors :

Leaving spaces between railway bars which are made of iron to avoid train accidents.

Where,
Iron is a good conductor of heat, so the railway bars expand and twist by heat.


Railway bars

Exercise

Write the scientific term :

1. *Materials that don't let heat flow through.* (..............)
2. *A form of energy that transfers from a higher temperature object to a lower temperature object.* (..............)
3. *The degree of hotness or coldness of a body.* (..............)

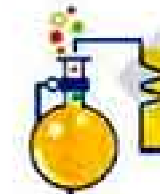
life applications	تطبيقات حياتية	railway bars	قضبان السكة الحديد	bonding	ربط
leakage	تَسَرُّب	twist	تلتوى	accidents	حوادث







1. All metals are good conductors of heat.
2. Metals are different in conducting heat, which means that some metals conduct heat faster than others.



Activity 2 To show that metals are different in conducting heat :





Tools:

Two metallic racks – three metallic rods (copper, aluminium and iron) with the same length and thickness – molten wax – office pins – flame – stop watch.

Steps:

aluminium copper office pin iron rack

1. Stick an office pin on one tip of each metallic rod by using wax.
2. Put the three metallic rods on the two racks as shown in the figure, where the end that doesn't contain the office pin is exposed to the flame.
3. Record the time taken by each office pin to fall down by using the stop watch.

Observation:

The pin fixed on the copper rod falls first, then the pin fixed on the aluminium rod and at the end the pin fixed on the iron rod.



Conclusion:

Different metals differ in conducting heat where ,

- Copper conducts heat faster than aluminium.
- Aluminium conducts heat faster than iron.

metallic rack	حامل معدنى	office pins	دبابيس مكتب	thickness	السُمك	tip	طرف







Usages of heat conductors and heat insulators :

Material & its type	Usage
- **Aluminuim and stainless steel.** (Heat conductors)	They are used in making : a. Cooking pots (Cooking utensils). b. Kettles that are used in houses and factories.
- **Plastic and wood.** (Heat insulators)	They are used in making the handles of : a. Cooking pots. b. Electric iron. c. Kettles.
- **Wool.** (Heat insulator)	It is used in making heavy blankets and woolen clothes, so they are used in winter to keep the body warm and prevent the leakage of heat.

cooking pots (utensils)	أوانى للطهى	kettles	غلايات	handles	أيدى / مقابض
electric iron	مكواة كهربية	heavy blankets	بطاطين ثقيلة	woolen clothes	الملابس الصوفية





Heat has many usages in industry such as :

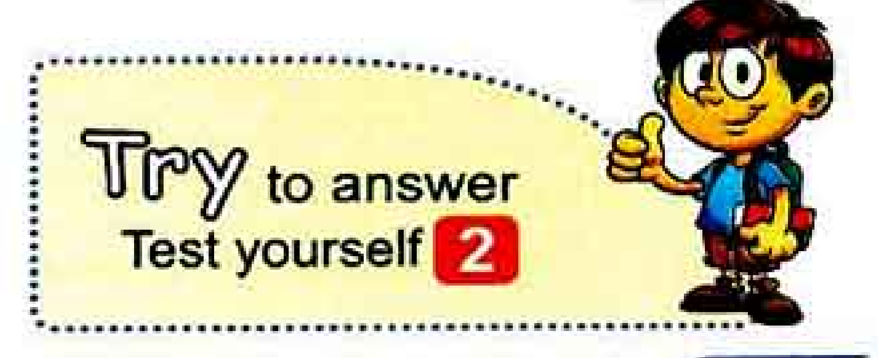
- Making and processing food.
- Glass industry.
- Paper industry.
- Textile industry.

G.R.

- **Woolen clothes are used in winter.**
  To keep our bodies warm as they are heat insulators.
- **Cooking pots are made of aluminium, while their handles are made of plastic.**
  Because aluminium is a heat conductor, while plastic is a heat insulator.

Comparison between heat conductors and heat insulators :

Points of comparison	Heat conductors	Heat insulators
Definition :	They are the materials that let heat flow through.	They are the materials that don't let heat flow through.
Examples :	Copper , aluminium , iron , mercury and stainless steel.	Glass, wood , paper , plastic , wool , air and rubber.
Usages :	They are used in making : - Cooking pots (utensils). - Kettles (boilers).	They are used in making: 1. The handles of : cooking utensils, kettles and electric iron. 2. Heavy blankets and woolen clothes.





Remember



Heat energy :

It is the form of energy that transfers from the higher temperature object to the lower temperature object.

Temperature :

It is the degree of hotness or coldness of a body.

Thermometers are devices used to measure temperature.

Heat conductors :

They are materials that let heat flow through.

- *Examples :* Copper, aluminium, iron, mercury and stainless steel.
- **They are used in making :** cooking pots and kettles.
- **All metals are good conductors of heat.**

Heat insulators :

They are materials that don't let heat flow through.

- *Examples :* Glass, wool, wood, rubber, air and plastic.
- ***They are used in making :***

- handles of : cooking pots, electric iron and kettles.
- woolen clothes and heavy blankets.

Metals are different in conducting heat, where :

- Copper conducts heat faster than aluminium.
- Aluminium conducts heat faster than iron.





Questions on lesson one

Questions signed by 📖 have been taken from the school book.

1. Choose the correct answer :

1. Heat transfers from .... *(Ismaila 2012)*
   a. a hot object to an object that has the same temperature.
   b. a cold object to a hot object.
   c. a hot object to a cold object.
   d. a cold object to an object that has the same temperature.
2. When you touch a piece of ice, heat transfers .... *(Menofia 2012)*
   a. from hand to ice. b. from ice to hand.
   c. from hand to air to ice. d. from air to ice.
3. The degree of hotness or coldness of a body is called .... *(Behiera 2016)*
   a. temperature. b. heat.
   c. a good conductor of heat. d. an insulator.
4. Which of the following devices is the measuring device of temperature ? ....
   a. Recorder. b. Thermometer.
   c. Barometer. d. Scale.
5. Materials are divided into ....
   a. heat conductors only. b. heat insulators only.
   c. (a) and (b). d. heat energy.
6. .... is a good conductor of heat. *(Dakahlia 2017)*
   a. Plastic b. Glass
   c. Copper d. Wood
7. All the following are good conductors of heat except .... *(Kalyoubia 2017)*
   a. aluminium and iron. b. copper and iron.
   c. glass and wood. d. aluminium and copper.
8. .... is a bad conductor of heat. *(Giza & Beni-Suef 2017)*
   a. Copper b. Glass
   c. Aluminium d. Iron
9. Wood is a heat insulator, because ....
   a. it allows heat to flow through. b. it doesn't let heat flow through.
   c. it conducts heat. d. all the previous answers.



10. Copper ....
    a. doesn't allow heat to flow through.
    b. allows heat to flow through.
    c. is a heat insulator.
    d. all the previous answers.
11. From the applications of heat conductors is ....
    a. making the insulating glass windows.
    b. leaving spaces between the railway bars.
    c. making the handles of iron and kettles from plastic.
    d. no correct answer.
12. Air is used in making the insulating glass windows as it ....
    a. is a heat conductor.
    b. is a heat insulator.
    c. prevents the leakage of heat.
    d. (b) and (c).
13. As a result of heat flow through metals, they .... *(Beni-Suef 2016)*
    a. expand.
    b. contract.
    c. get bigger.
    d. (a) and (c).
14. Aluminium conducts heat better than ....
    a. iron.
    b. glass.
    c. wood.
    d. (a) , (b) and (c).
15. Which of the following is faster in conducting heat ? .... *(Menofia & Behiera 2017)*
    a. Copper.
    b. Iron.
    c. Aluminium.
    d. Glass.
16. All the following are uses of good heat conductors except the manufacturing of ....
    a. cooking pots.
    b. handles of kettles (boilers).
    c. kettles.
    d. (a) and (c).
17. Insulators are used in making ....
    a. heavy blankets and woolen clothes.
    b. handles of cooking pots.
    c. cooking utensils.
    d. (a) and (b).
18. Cooking utensils are provided with handles of .... *(Giza 2016)*
    a. copper.
    b. plastic.
    c. iron.
    d. aluminium.
19. Woolen clothes and heavy blankets are used in winter to keep .... *(Sharkia 2016)*
    a. body warm.
    b. weather warm.
    c. body cold.
    d. weather cold.

2. **Put (✓) in front of the right statements and (✗) in front of the wrong statements, then correct the underlined words in the wrong ones :**

1. Heat is the form of energy that transfers from the lower temperature object to the higher one. *(Ismailia 2013)* ( )
2. Heat transfers from cold object to hot object. *(El-Minia & Matrouh 2017)* ( )
3. 📖 All materials are good conductors of heat. *(Qena 2013)* ( )
4. The measuring devices of temperature are scales. ( )
5. Heat is the degree of hotness or coldness of a body. ( )
6. Copper, iron and air allow heat to transfer through. ( )
7. Plastic is a good heat conductor. *(South Sinai 2012)* ( )
8. Plastic, paper and air are bad conductors of heat. ( )
9. Air is a bad conductor of heat. *(Ismailia 2016)* ( )
10. Copper is a good conductor of heat. ( )
11. 📖 Aluminium is a bad conductor of heat. *(Kalyoubia 2013)* ( )
12. Air is used in the manufacturing of insulating glass windows as it is an insulator. ( )
13. Materials that conduct heat are called heat insulators. ( )
14. The different metals transfer heat at the same rate. *(Suez 2017)* ( )
15. 📖 Aluminium conducts heat faster than copper. *(Gharbia 2017)* ( )
16. Iron conducts heat faster than aluminium. ( )
17. 📖 Cooking pots are made of plastic. *(Cairo & Ismailia 2017)* ( )
18. Handles of cooking pots are made of copper. *(Red Sea 2017)* ( )
19. 📖 Wood is a good conductor of heat. *(Aswan 2014)* ( )
20. Heavy blankets and woolen clothes are used in winter to keep the weather cold. *(Giza & Assiut 2016)* ( )

3. **Write the scientific term :**

1. A form of energy that transfers from the higher temperature object to the lower temperature object. *(Gharbia & Port Said 2016)* (..................)
2. A form of energy that is used in heating water and warming the house. (..................)
3. The degree of hotness or coldness of a body. *(Alex. & Menofia 2017)* (..................)

4. An indicator helps us to express the state of the body from the point of hotness and coldness. *(Giza & Port Said 2017)* (................)
5. The measuring devices of temperature. *(El-Minia 2017)* (................)
6. Materials that let heat flow through. *(Sohag 2017)* (................)
7. Materials that do not let heat flow through. *(Sharkia 2017)* (................)
8. The fastest metal in conducting heat. (................)
9. The materials that are used in making cooking pots and kettles. (................) *(Damietta 2012)*
10. A type of clothes used in winter to keep the body warm. (................) *(Behiera & Ismailia 2013)*
11. Materials that are used in the manufacturing the handles of cooking utensils, electric iron and kettles. *(Behiera 2017)* (................)

4. Complete the following statements :

1. Heat transfers from the .... temperature object to the .... temperature object. *(Sharkia 2017)*
2. Heat is a form of .... *(Giza & Suez 2017)*
3. .... , ... and .... are from the importance of heat in our daily life.
4. Heat is used in some industries such as .... and ....
5. The temperature is considered as an indicator that helps us to express .... and .... of the body. *(Beni-Suef 2017)*
6. .... is the degree of hotness or coldness of a body. *(Port Said 2016)*
7. We measure temperature by using ....
8. Materials are divided into .... heat conductors and .... heat conductors. *(Menofia 2017)*
9. .... , ... and .... are good conductors of heat. *(South Sinai 2016)*
10. .... , ... and .... are bad conductors of heat. *(Aswan 2017)*
11. All metals are .... conductors of heat. *(Suez 2017)*
12. .... are the materials that allow heat flow through.
13. .... are the materials that don't allow heat to flow through.
14. .... is a good heat conductor, while air is ....
15. Air is used in making .... as it is a heat insulator.
16. .... conducts heat faster than aluminium. *(Luxor 2013)*

17. Plastic is .... conductor of heat, while copper is .... conductor of heat. *(Kalyoubia 2015)*
18. .... and .... are used in making the handles of cooking pots and kettles. *(Damietta 2013)*
19. 📖 .... and .... are some usages of good heat conductors. *(Alex. 2013)*
20. 📖 .... , ... and .... are some usages of bad heat conductors. *(Kalyoubia 2012)*
21. .... is used in making heavy blankets and .... that keep the body warm.
22. Cooking pots are made of .... , while handles of cooking pots are made of .... *(Sharkia 2013)*

5. Give reasons for the following :

1. Heat is an important form of energy in our daily life.
....
....
2. Heat has countless usages in industry.
....
3. Copper, iron and aluminium are good conductors of heat.
....
4. Wood, glass, plastic and paper are bad conductors of heat (insulators).
....
5. Wood is an insulator, while copper is a heat conductor.
....
6. Air is used in making insulating glass windows. *(Kafr El-Sheikh 2016)*
....
7. Leaving spaces between the railway bars. *(Kayloubia & Sharkia 2017)*
....
....
8. Plastic differs from copper in conducting heat. *(Giza 2013)*
....
....
9. Copper differs from iron and aluminium in conducting heat. *(Sohag 2015)*
....

1 Lesson

10. Cooking utensils and kettles are made of aluminium or stainless steel. *(Dakahlia & Gharbia 2017)*

....

11. The handles of cooking utensils are made of plastic or wood. *(Alex. & Kafr El-Sheikh 2017)*

....

12. Aluminium and stainless steel are very important heat conductors.

....

....

13. The handle of electric iron is made of plastic.

....

14. We used the heat insulators as wool in making heavy blankets and woolen clothes.

....

15. Cooking pots are made of aluminium, while their handles are made of plastic or wood. *(Suez & El-Minia 2017)*

....

....

16. It is necessary to wear heavy woolen clothes in winter. *(Ismailia 2017)*

....

6. What happens when ...?

1. You hold a piece of ice in your hands. *(Damietta 2011)*

....

2. You hold a hot cup of tea in your hands. *(Kalyoubia 2015)*

....

3. You touch one end of a copper rod, where the other end is exposed to the flame of a candle.

....

4. You touch the end of a glass rod, where the other end is exposed to the flame of a candle.

....

5. Two bodies have the same temperature touch each other. *(Ismailia 2014)*

....

6. There are no spaces between the railway bars. *(Menofia & Gharbia 2017)*

....

7. The handles of kettles and cooking utensils are made of stainless steel. *(Port Said 2017)*

....

8. All substances, that the man uses are good conductors of heat. *(Kalyoubia 2017)*

....

....

7. Define :

1. Heat.

....

2. Temperature. *(North Sinai 2017)*

....

3. Heat conductors. *(Port Said 2015)*

....

4. Heat insulators. *(Alex. 2011)*

....

8. What is the importance (usage) of ...?

1. Heat energy (thermal energy).

....

2. Good conductors of heat.

....

3. Bad conductors of heat. *(Aswan 2016)*

....

4. Aluminium and stainless steel. *(Dakahlia 2016)*

....

5. Wood and plastic.

....

6. Heavy blankets and woolen clothes in winter. *(Kafr El-Shiekh 2016)*

....

7. Plastic in the manufacture of the handles of cooking utensils. *(Kalyoubia 2016)*

....



9. Classify the following materials in the following table into heat conductors and heat insulators :

(Copper – Plastic – Glass – Stainless steel – Paper – Wool – Iron – Aluminium – Air – Wood)

Heat conductors	Heat insulators

10. Compare between each pair of the following:

1. Heat and temperature : *(Alex. 2014)*

Point of comparison	Heat	Temperature
Definition :	....	....

2. Good conductors of heat and bad conductors of heat: *(Giza 2017)*

Points of comparison	Good conductors of heat	Bad conductors of heat
1. Definition :	....	....
2. Examples :	....	....
3. Usage :	....	....

11. In the opposite figure there are two rods, one is a copper rod and the other is an aluminium rod.



1. Which rod in the opposite figure is copper ? Why ?

....

2. What do you conclude from this activity ?

....



Timss Questions



1. Carry out the following activity, then answer the following questions.

1. Which hand feels heat ?

....

2. Explain what happens.

....

....

2. A hot, boiled egg is put into a cup of cold water.

What happens to the temperature of the water and the egg ?

a. The water gets colder and the egg gets warmer.

b. The water gets warmer and the egg gets colder.

c. The water temperature stays the same and the egg gets colder.

d. The egg temperature stays the same and the water gets warmer.

3. • You have three similar iron cubes as shown in the figure.

If you heat up cube (B).

• **What do you expect ?**

I expect that heat transfers from cube (B) to cube .... faster than from cube (B) to cube ....

• **Give a reason for your answer.**

....

....



Lesson 2 Measuring temperature

You have learned, in the previous lesson, that temperature is the degree of hotness or coldness of an object. So, what is the importance of measuring temperature?

The importance of measuring temperature :







1. Helping us to know our bodies' temperature.
2. Helping us to know the weather temperature which affects our life skills.
3. Some processed food industries require a certain temperature.

But, we can't depend on the sense of touching to detect the temperature of objects. So, we need a certain device called "thermometer" to measure the temperature of objects accurately.

Thermometer

It is a device that is used to measure the temperature.

measuring	قياس	require	يحتاج	weather temperature	درجة حرارة الجو	accurately	بدقة
skills	مهارات	food industries	صناعات الغذاء	sense of touching	حاسة اللمس		



How does thermometer work ?

To answer this question, you should apply the following activity.



Activity 1 To show how a thermometer works :

Tools:

- Water.
- Ethyl alcohol.
- Plastic bottle.
- Blue colour.
- Straw.
- Clay.
- Beaker with hot water.
- Beaker with iced water.
- Hard paper.

Steps:

1. Fill the bottle with similar two quantities of water and ethyl alcohol.
2. Add some drops of the blue colour and stir.
3. Put the straw in the bottle , where it does not touch the bottom of the bottle.
4. Use the clay to fix the straw and close the mouth of the bottle.
5. Cut two cracks in the hard paper , then fix the straw through the two cracks.
6. Mark the liquid level using a colouring crayon.
7. Put the bottle inside a beaker with hot water, then mark the liquid level using a colouring crayon.

straw
hard paper
clay
coloured water + ethyl alcohol

Observation:

The level of the liquid in the straw rises up.

8. Put the bottle inside a beaker with iced water.

Observation:

The level of the liquid in the straw falls down.

ethyl alcohol	كحول إيثيلى	straw	ماصه	hard paper	ورق مقوى
crack	شق	colouring crayon	قلم تلوين	rises	يرتفع



Lesson 2

Conclusion:

The main idea of making thermometers is changing the volume of liquid by changing the temperature.

Where, liquids expand by heating and contract by cooling.

Types of thermometers :

There are many types of thermometers, but in this lesson, we will study two types only which are :

1. **Medical thermometer.**
2. **Celsius thermometer.**

1 Medical thermometer (or clinical thermometer)

The medical thermometer:

It is the thermometer that is used to measure the temperature of human body.

Its structure : It consists of :

1. Thick glass tube

It is a thick tube made of transparent glass.

2. Capillary tube

It is a very thin tube that is closed from one of its ends.

3. Constriction

There is a constriction in the capillary tube, above the mercury bulb.

• Its function :

It prevents mercury from going back to the bulb quickly in order to read the measurement easily.

4. Mercury bulb

It is a bulb filled with mercury and connected to the other end of the capillary tube.

contract	تنكمش	constriction	اختناق	mercury bulb	مستودع الزئبق
capillary tube	أنبوبة شعرية	expand	تتمدد	transparent	شفاف
medical	طبى				



Its scale :

- The scale of the medical thermometer starts from 35°C to 42°C.
- Each degree is divided into 10 parts so, each part equals $\frac{1}{10}$ degree.

How to use the medical thermometer to measure your body temperature :



Medical thermometer


Ethyl alcohol


Tissue paper

Steps:

1. Sterilize the medical thermometer using ethyl alcohol.
2. Dry the thermometer very well using a tissue paper.
3. Shake the thermometer well until the mercury goes back to the bulb.
4. Put the thermometer under your tongue for a minute.
5. Get the thermometer out from your mouth, then record the temperature reading.
6. Sterilize the thermometer using ethyl alcohol and put it in its box.





Notes

1. The normal temperature of a healthy person is 37°C.
2. Don't seize the thermometer firmly with your teeth in order not to be broken because mercury is a toxic substance.

sterilize	يعقم	tissue paper	منديل ورق	shake	رج
scale	تدريج	toxic	سام	seize	يضغط
firmly	بشدة				

2
Lesson

G.R.

- **We must shake the medical thermometer well before use.**
  To force the mercury back to the mercury bulb.
- **The medical thermometer must be kept out the reach of children.**
  Because mercury inside the thermometer is a toxic substance.

Technological application :

Digital thermometers :

They are modern devices
which display the body temperature digitaly
and used especially for children.

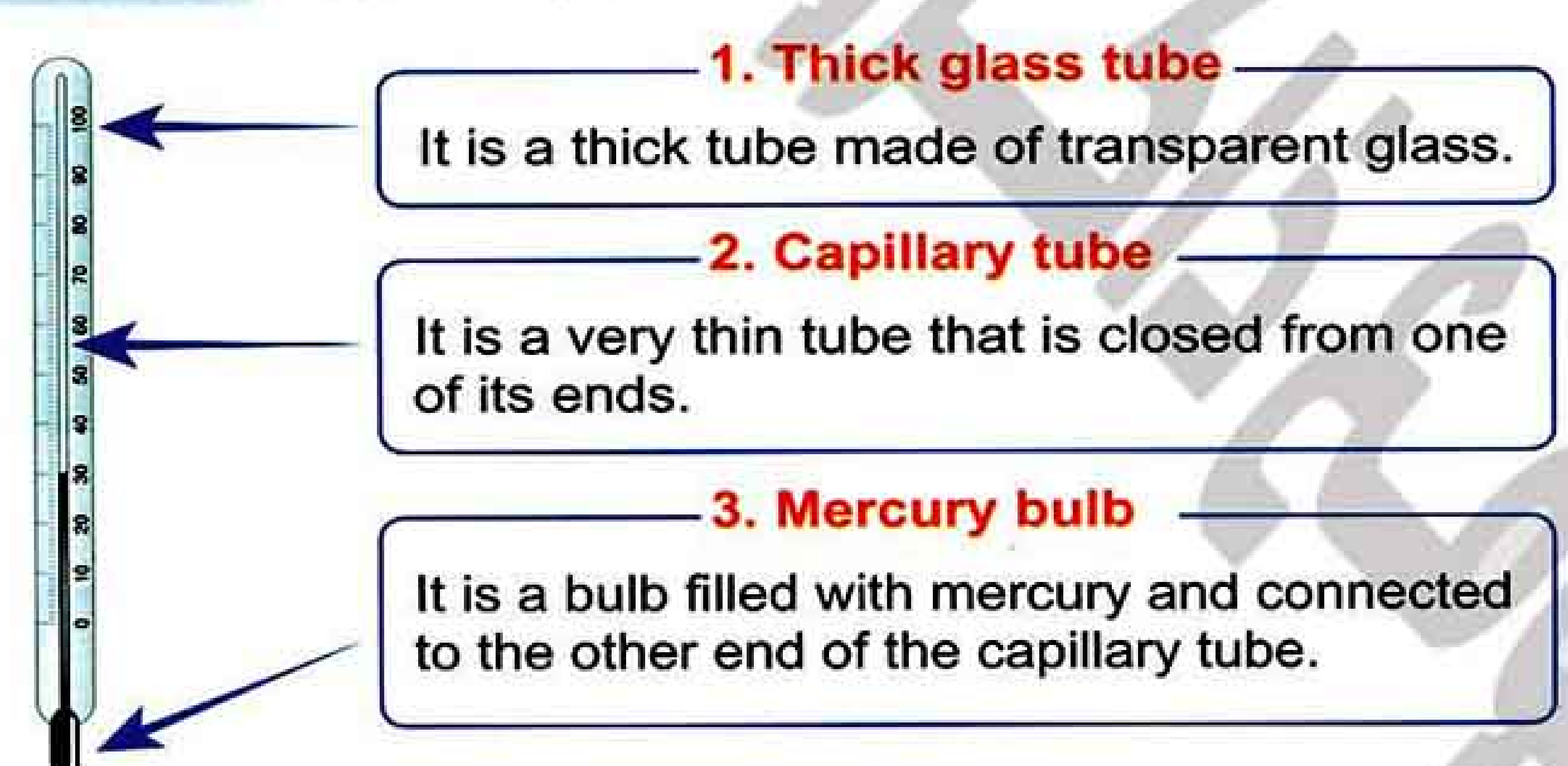


2 Celsius thermometer

Celsius thermometer :

It is the thermometer that is used to measure the temperature of liquids.

Its structure : It consists of :



1. Thick glass tube

It is a thick tube made of transparent glass.

2. Capillary tube

It is a very thin tube that is closed from one of its ends.

3. Mercury bulb

It is a bulb filled with mercury and connected to the other end of the capillary tube.

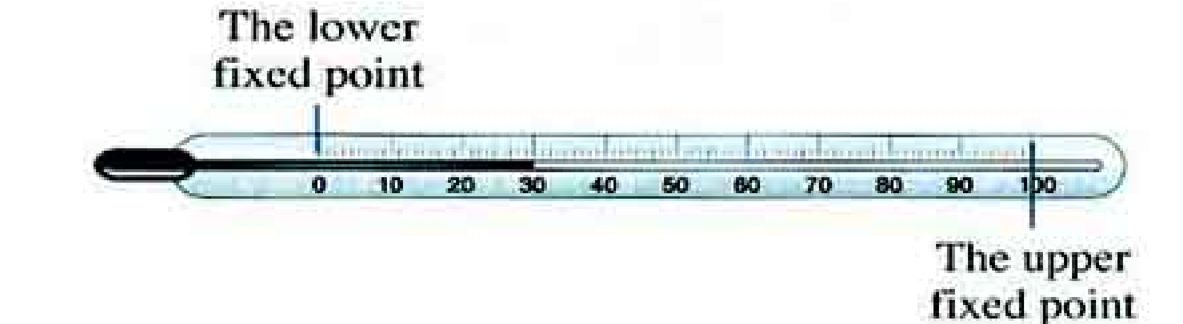
Its scale :

- The scale of Celsius thermometer starts from 0°C to 100°C.
- Every degree is represented by one part on this scale.

reach	مُتناول	digital	رقمى







1. In Celsius thermometer, there is no constriction above the mercury bulb.
2. In Celsius thermometer :
   a. The lower fixed point is 0°C which is known as the melting point of ice or the freezing point of water.
   b. The upper fixed point is 100°C which is known as the boiling point of water.

Scientists helped humanity :

- The swedish scientist **"Anders Celsius"** created the Celsius scale in 1742.
- He considered the 0° as the melting point of ice and 100° as the boiling point of water.
- He divided the distance between 0°C and 100°C into 100 parts, where each part equals one degree.


Anders Celsius

G.R.

- **Medical thermometer can't be used to measure the temperature of boiling water.**
  Because the scale of medical thermometer ranges from 35°C to 42°C, while the temperature of boiling water is 100 °C.



Complete the following sentences :

1. *The scale of the medical thermometer starts from .... to ....*
2. *The .... thermometer is used to measure the temperature of liquids.*
3. *There is a .... in medical thermometer which is not found in Celsius thermometer.*
4. *The freezing point of water is .... °C, while the boiling point of water is .... °C.*

humanity	البشرية	create	يصمم	melting point	درجة الانصهار
boiling point	درجة الغليان	swedish	السويدى		



2 Lesson



Activity 2 To show that Celsius thermometer is used in measuring the temperature of liquids :

Tools:

- Celsius thermometer.
- Glass of cold drink.
- Glass of hot tea.
- Glass of warm water.

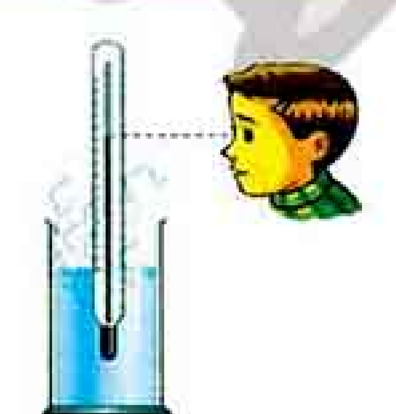
Steps	Figures	Observations
1. Put the Celsius thermometer in the hot tea, then wait until mercury rises and stops to record the temperature.	80 / hot tea	The mercury level stops at 80°C.
2. Repeat the previous step by putting the thermometer in a glass of cold drink.	5 / cold drink	The mercury level stops at 5°C.
3. Repeat the first step by putting the thermometer in a glass of warm water.	40 / warm water	The mercury level stops at 40°C.

Conclusion:

Celsius thermometer is used in measuring the temperature of liquids.

Note

- While recording the temperature, the thermometer must be vertical and the direction of sight must be perpendicular to the thermometer.



Why is mercury preferred in making thermometers ?

Mercury is used in making thermometers because :

1. It is a liquid metal that can be seen easily through the thermometer glass.
2. It is a good conductor of heat.
3. It is a regular expanding material (expands regularly), that makes mercury gives an accurate estimation.



Mercury is used in making thermometers.

4. It doesn't stick to the walls of the capillary tube.
5. It remains in a liquid state between (– 39°C) and (357°C) and this gives a wide range to temperature measurement.

Enrichment information

Some thermometers contain two scales,
one represents Celsius scale (°C)
and the other represents
Fahrenheit scale (°F).
, **Where**
0°C = 32°F and 100°C = 212°F



Try to answer :
* Test yourself 3
* General exercise of the school book on unit 2
* Model exams on unit 2

Comparison between Celsius thermometer and medical thermometer :

Points of comparison	Celsius thermometer	Medical thermometer
1. Structure :	a. Transparent thick glass tube. b. Capillary tube closed from one of its ends. c. Mercury bulb that is filled with mercury and connected to the other end of the capillary tube.	
2. Constriction :	Absent.	Present.
3. Range of scale :	From 0°C to 100°C	From 35°C to 42°C
4. The used liquid :	Mercury.	Mercury.
5. Usage :	It is used to measure the temperature of liquids.	It is used to measure the temperature of human body.

regular expanding material مادة منتظمة التمدد | stick يلصق | Fahrenheit الفهرنهايت
accurate دقيق | estimation تقدير

Remember



Thermometer :

- It is a device that is used to measure the temperature.
- The main idea of making thermometers is changing the volume of liquid by changing the temperature, where liquids expand by heating and contract by cooling.
- Mercury is the liquid that is used in the manufacture of thermometers.

Types of thermometers :

- Medical thermometer.
- Celsius thermometer.

Medical thermometers :

- It is used to measure the temperature of the human body.
- It has a constriction to prevent mercury from going back to the bulb quickly.
- Its scale starts from 35°C to 42°C.
- Each degree is divided into 10 parts, so each part equals $\frac{1}{10}$ degree.
- Alcohol is used to sterilize the medical thermometer.
- The normal temperature of a healthy person is 37°C.

Celsius thermometer :

- It is used to measure the temperature of liquids.
- It doesn't have a constriction.
- Its scale starts from 0°C to 100°C.
- Every degree is represented by one part on its scale.
- 0°C is known as the melting point of ice or the freezing point of water.
- 100°C is known as the boiling point of water.

Mercury is used in making thermometers because :

- It is a liquid metal.
- It is a good conductor of heat.
- It is a regular expanding material.
- It doesn't stick to the walls of the capillary tube.
- It gives a wide range to temperature measurement [because it remains in a liquid state between (–39°C) and (357°C)].



Questions on lesson two

Questions signed by 📖 have been taken from the school book.

1. Choose the correct answer :

1. .... is used to indicate the temperature of weather accurately.
   a. Sense of touch b. Electric heater
   c. Thermometer d. Barometer
2. The operation of thermometer depends on the idea of .... *(Giza 2017)*
   a. the change of gas volume with the change in temperature.
   b. the change of liquid volume with the change in temperature.
   c. the change of gas mass with the change in temperature.
   d. the change of liquid mass with the change in temperature.
3. .... is used to measure the body temperature.
   a. Celsius thermometer b. Medical thermometer
   c. Thermostat d. (a) and (b)
4. The medical thermometer is characterized than the Celsius thermometer by the presence of a ....
   a. mercury bulb. b. constriction.
   c. capillary tube. d. scale.
5. The bulb of the medical thermometer is filled with ....
   a. alcohol. b. water. c. mercury. d. air.
6. The minimum and maximum graduation of the medical thermometer is between .... *(Giza & Aswan 2016)*
   a. 37°C to 42°C b. 35°C to 40 °C
   c. 35°C to 42°C d. 30°C to 50°C
7. The temperature of liquids is measured by using ....
   a. Celsius thermometer. b. medical thermometer.
   c. thermostat. d. (a) and (b).
8. Celsius thermometer is used to measure the ....
   a. patient's temperature. b. boiling point of water.
   c. melting point of ice. d. (b) and (c).



9. The used liquid in the Celsius thermometer is .... *(Menofia 2017)*
   a. alcohol. b. water. c. hydrogen peroxide. d. mercury.

10. The melting point of ice is .... *(Suez 2011)*
    a. 0°C b. 100°C c. 37°C d. 42°C

11. The scale of Celsius thermometer ranges between .... *(Damietta 2014)*
    a. zero°C to 10°C b. zero°C to 100°C
    c. zero°C to 50°C d. 37°C to 42°C

12. The .... thermometer contains a constriction. *(Qena 2013)*
    a. Celsius b. medical
    c. (a) and (b) d. no correct answer

13. There is a constriction above the mercury bulb of the medical thermometer to .... *(Cairo 2011)*
    a. prevent mercury from expansion.
    b. prevent mercury from returning back to the bulb quickly.
    c. clear the temperature reading.
    d. measure the liquids temperature.

14. We should sterilize the medical thermometer by using .... *(New Valley 2014)*
    a. ethyl alcohol. b. boiling water.
    c. mercury. d. water.

15. Before using medical thermometer, we should shake it to ....
    a. sterilize it.
    b. force the mercury back into the bulb.
    c. clean it from dust.
    d. move the mercury to the top of the thermometer.

16. When the temperature of mercury increases, its volume ....
    a. increases regularly and contracts.
    b. decreases regularly and expands.
    c. decreases regularly and contracts.
    d. increases regularly and expands.

17. All the following are from the properties of mercury as a thermometrical substance except .... *(Gharbia & Aswan 2017)*
    a. good conductor of heat.
    b. its expansion is regular.
    c. gives limited extend to measure the temperature.
    d. it doesn't stick to the walls of the capillary tube.

18. The mercury remains in liquid state between .... °C. *(Beni-Suef 2017)*
    a. (39 : 357) b. (39 : –357) c. (–39 : 357) d. (0 : 100)
19. The medical thermometer is different from Celsius thermometer in ....
    a. the type of matter present in the glass bulb.
    b. the presence of constriction in the capillary tube.
    c. the type of matter used in manufacturing.
    d. the effect of change in temperature on the present liquid volume.
20. Every degree in the medical thermometer is divided into .... parts.
    a. 3 b. 5 c. 6 d. 10
    (Sharkia 2015)
21. The lower fixed point in the Celsius thermometer scale represents the .... freezing point. *(Cairo 2017)*
    a. liquids b. mercury c. water d. oil

2. Put (✓) in front of the right statements and (✗) in front of the wrong statements, then correct the underlined words in the wrong ones :

1. We can measure the temperature accurately by touching. ( )
2. The main idea to make a thermometer is changing the mass of liquid according to the temperature. *(Port Said 2017)* ( )
3. Medical thermometer and Celsius thermometer are from the types of thermometers. *(Sharkia 2011)* ( )
4. The medical thermometer has a capillary tube to prevent mercury from going back to the mercury bulb. ( )
5. The scale of the medical thermometer starts from 37°C to 42°C. ( )
   (Giza & Dakahlia 2017)
6. Each degree in the medical thermometer is divided into 3 parts. ( )
7. The graduation of clinical thermometer is from 37°C to 45°C and each degree is graduated to ten parts. *(Ismailia & Kafr El-Sheikh 2016)* ( )
8. You shouldn't sterilize the medical thermometer before use. ( )
9. You must shake the medical thermometer to force the mercury back to the mercury bulb. ( )
10. The Celsius thermometer is used for measuring the temperature of human being. *(Suez & Ismailia 2017)* ( )
11. There is a constriction above the mercury bulb in the Celsius thermometer. *(Sharkia 2017)* ( )
12. The normal temperature of the healthy person is 35°C. ( )
13. The scale of the medical thermometer starts from 0°C to 100°C. ( )
    (Damietta 2016)

14. The used liquid in the medical thermometer is water. *(Kalyoubia 2017)* ( )
15. The medical thermometer is used for measuring the temperature of liquids. ( )
16. Mercury is considered from bad conductor substances. *(El-Minia 2017)* ( )
17. One of mercury properties is that gives a narrow range to temperature measurement. *(Port Said & Luxor 2016)* ( )
18. Alcohol doesn't stick to the walls of the capillary tube so, it is used in making thermometers. *(Red Sea 2015)* ( )
19. The melting point of ice is 100°C. ( )
20. The highest degree in the Celsius thermometer represents the degree of water freezing. *(Alex. 2016)* ( )
21. Water is a regular expanding material. *(Port Said 2017)* ( )

3. Write the scientific term of each of the following statements :

1. An instrument used for measuring the temperature. *(Giza 2017)* (..................)
2. A device used for measuring the temperature of the human body. *(Sharkia & South Sinai 2016)* (..................)
3. A device used to measure the temperature of liquids. *(Gharbia 2017)* (..................)
4. The liquid that is used in making the medical and the Celsius thermometers. *(Beni-Suef 2017)* (..................)
5. The liquid that is used in sterilizing the medical thermometer. (..................)
6. The part of the medical thermometer that prevents mercury from going back to the bulb. (..................)
7. The thermometer whose scale ranges from 35°C to 42°C *(Kalyoubia 2017)* (..................)
8. A modern device used to measure body temperature especially for children. *(Giza 2016)* (..................)
9. The thermometer whose scale ranges from 0°C to 100°C. (..................)
10. The melting point of ice. (..................)
11. The boiling point of water. (..................)
12. The liquid metal that is good conductor of heat and used in making thermometers. *(Damietta 2011)* (..................)

4. Complete the following statements :

1. .... is a device used to measure temperature. *(Dakahlia 2017)*
2. Liquids .... by heating and .... by cooling.



3. The main idea of thermometer action is changing the .... of liquid inside as the .... changes. *(Gharbia 2017)*
4. 📖 The kinds of thermometers are .... and .... *(Suez 2015)*
5. 📖 The thermometer is ....
6. We can use the .... thermometer to measure the temperature of human bodies. *(Gharbia & El-Minia 2016)*
7. The medical thermometer consists of a .... bulb, ... with a constriction and a thick transparent glass tube.
8. The medical thermometer is characterized by the presence of a .... above the mercury bulb.
9. 📖 There is a constriction in the .... thermometer. *(Alex. 2014)*
10. In the medical thermometer, the .... prevents mercury from going back to the bulb quickly.
11. 📖 The scale of the medical thermometer starts from .... and ends at .... *(Gharbia & Port Said 2017)*
12. Each degree in the medical thermometer is divided into .... parts, so each part equals .... degree.
13. The liquid used in the thermometers is ....
14. 📖 The Celsius thermometer is used in measuring .... *(Cairo & Suez 2016)*
15. The Celsius thermometer consists of .... bulb, ... without constriction and a thick glass tube.
16. The graduation of Celsius thermometer starts from .... to .... *(Kalyobia 2016)*
17. We use .... to sterilize the .... thermometer.
18. Mercury is a .... metal which is .... conductor of heat.
19. Mercury doesn't .... to the walls of the ....
20. The Celsius thermometer is used in ...., whereas the medical thermometer is used in .... *(Behiera & Sohag 2017)*
21. .... thermometer has a constriction, but .... thermometer hasn't constriction.
22. 📖 Water is freezed at ....°C and boiled at .... °C *(Behiera 2017)*
23. The measuring unit of temperature is called .... *(Port Said 2017)*
24. Mercury remains liquid between two degrees of temperature which are .... and .... *(Menofia 2017)*



5. Give reasons for the following :

1. We can't measure the temperature of objects by touching.

....

....

2. There is a constriction above the mercury bulb in the medical thermometer. *(Kalyoubia & Fayoum 2017)*

....

....

3. The medical thermometer must be put in ethyl alcohol before using.

....

4. We must shake the medical thermometer well before using. *(Ismailia 2014)*

....

5. The thermometer must be kept out the reach of children.

....

6. The medical thermometer can't measure the temperature of iced water.

....

....

7. We can't measure the boiling point of water by using the medical thermometer. *(Gharbia & Damietta 2015)*

....

....

8. Mercury is used in thermometers. *(Sharkia & Behiera 2017)*

....

....

....

9. Mercury gives wide range to measure the temperature. *(Giza 2016)*

....

10. The idea of making thermometers depends on changing the volume of liquid by changing temperature.

....

6. What happens if ...?

1. A medical thermometer is put in boiled water. *(Port Said 2016)*

   ....

2. There is no constriction above the mercury bulb in the medical thermometer. *(Dakahlia & Sohag 2017)*

   ....

3. Water is used instead of mercury in making thermometers.

   ....

4. We don't shake the medical thermometer well before use.

   ....

5. The medical thermometer is not sterilized before use.

   ....

6. Increasing the temperature of mercury. *(Alex. 2016)*

   ....

7. Mention the use of :

1. Thermometers.

   ....

2. Medical thermometer. *(Beni Suef 2013)*

   ....

3. Celsius thermometer. *(Cairo & Dakahlia 2017)*

   ....

4. Mercury in thermometers. *(Damietta 2016)*

   ....

5. The constriction of the medical thermometer. *(Behiera & Damietta 2017)*

   ....

6. Ethyl alcohol. *(Sharkia 2015)*

   ....

8. Explain by steps how to use the medical thermometer to measure the temperature of a patient.

....

....

....

....

9. Look at the following figures, then answer :

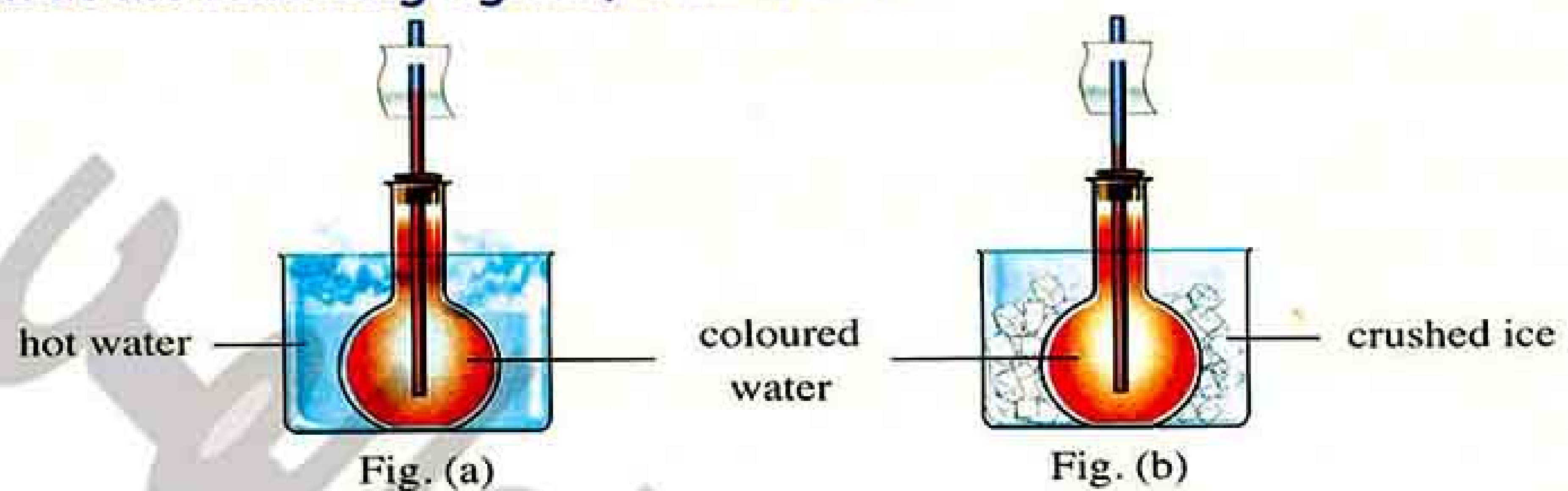


Fig. (a) Fig. (b)

1. In fig. (a), the coloured water moves up, because its volume .... by ....
2. In fig. (b), the coloured water moves down, because its volume .... by ....
3. What do you conclude from this activity ?

....

10. Complete the following table:

Medical thermometer	Celsius thermometer
1. Its bulb is filled with	1. Its bulb is filled with ....
2. It is graduated from .... to	2. It is graduated from .... to ....
3. It has .... to prevent mercury from going back to the bulb.	3. It hasn't ....
4. It is used to measure the temperature of	4. It is used to measure the temperature of ....

11. Look at the following figure, then answer : *(Cairo & Suez 2017)*

1. Label the figure.

(1) .... (2) ....

(3) .... (4) ....

2. This figure shows the structure of .... which is used to measure ....
3. What is the function of part (1) ?

....

4. This thermometer is graduated from .... to ....

(4)
(3)
(1)
(2)

12. **This figure shows the Celsius thermometer.** *(South Sinai 2017)*
Answer the following questions:

1. Label the figure.
   (1) ....
   (2) ....
   (3) ....
2. 0°C is the point of .... or the point of ....
3. 100°C is the point of ....
4. This thermometer is used in measuring ....



13. **Compare between the medical thermometer and the Celsius thermometer according to :** *(El-Beheira 2016)*

1. Usage.
2. Structure.
3. Used liquid.
4. Scale.

....
....
....
....



Timss Questions

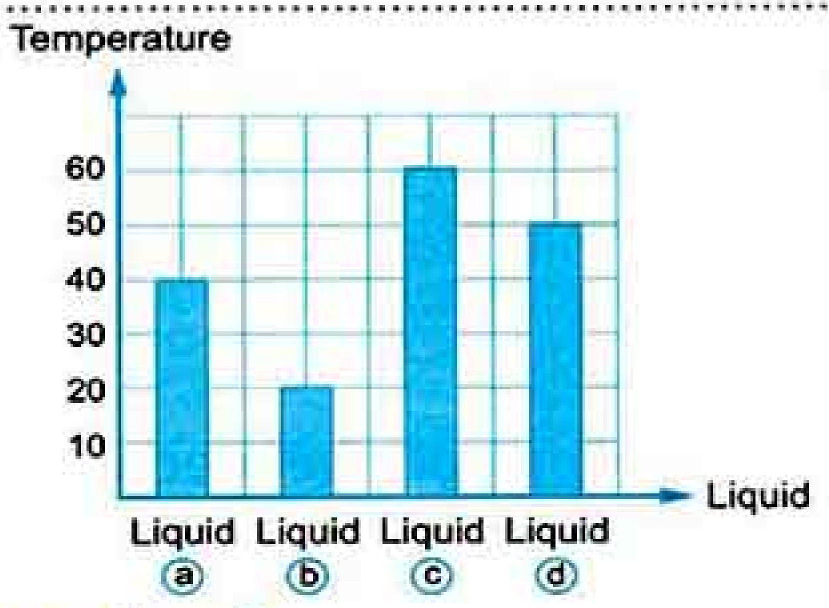


1. Rania has a medical thermometer. She wants to measure her body temperature. She wants to sterilize the thermometer using some boiling water.

- **Do you agree with Rania ?** Yes No
- **Give a reason for your choice.**

....

2. Ahmed uses his thermometer to measure the temperature of some different liquids.
He draws the opposite graph for his results.



a. **What is the liquid that has the highest temperature ?**

....

b. **What is the liquid that has the lowest temperature ?**

....

c. **What is the type of thermometer that Ahmed used ?**

....

3. Choose from columns Ⓑ and Ⓒ what suits to column Ⓐ :

Ⓐ	Ⓑ	Ⓒ
1. Lower point of Celsius thermometer	a. 100°C	f. melting point of ice.
2. Medical thermometer	b. has no constriction	g. 42°C.
3. Upper point of Celsius thermometer	c. has a constriction	h. used to measure the temperature of liquids.
4. The range of medical thermometer	d. 0°C	i. boiling point of water.
5. Celsius thermometer	e. 35°C	j. used to measure the temperature of human body.

1. → .... → ....
2. → .... → ....
3. → .... → ....
4. → .... → ....
5. → .... → ....



UNIT THREE

The Atmosphere

Lessons of the unit :

1. Oxygen.
2. Carbon dioxide.
3. Nitrogen.

Unit Objectives : By the end of this unit, you will be able to :

- Mention the gases composing the air and their proportions.
- Identify the preparation of oxygen in the laboratory.
- Identify the properties of oxygen.
- Determine the importance and uses of oxygen.
- Identify the sources of carbon dioxide emission.
- Identify the preparation of carbon dioxide in the laboratory.
- Identify the properties of carbon dioxide.
- Determine the importance and uses of carbon dioxide.
- Identify the preparation of nitrogen in the laboratory.
- Identify the properties of nitrogen.
- Determine the importance and uses of nitrogen.



Lesson 1 Oxygen

⊙ What is the atmosphere ?

- Atmosphere is a mixture of different gases surrounding the Earth.
- Atmosphere is attracted to the Earth by gravity.

⊙ What are the components of atmosphere ?



Atmosphere is composed of :

1. Nitrogen gas that represents 78%
2. Oxygen gas that represents 21%
3. Carbon dioxide gas, water vapour and other gases (as argon, neon, helium and others) that represent 1%



Note

Air pollutants as dust particles , smoke and gases (produced by factories, cars, trains and ships) help in condensation of water vapour around and formation of rains or snow.

⊙ What is the importance of the atmosphere?

1. It protects the Earth by absorbing ultraviolet radiation coming from the outer space.
2. It adjusts the temperature of the Earth's surface.

gravity	الجاذبية	dust particles	جزيئات الغبار	outer space	الفضاء الخارجى	radiation	إشعاعات
adjusts	يضبط	ultraviolet	فوق البنفسجية	condensation	تكاثُف	air pollutants	ملوثات الهواء

Oxygen gas :

- Oxygen exists in the atmosphere in a gaseous state.
- It represents 21% of the air volume.

Structure of oxygen :

An oxygen molecule (O_2) consists of two oxygen atoms (O), where (O) is the first letter of the word oxygen.



Oxygen molecule

Source of oxygen :

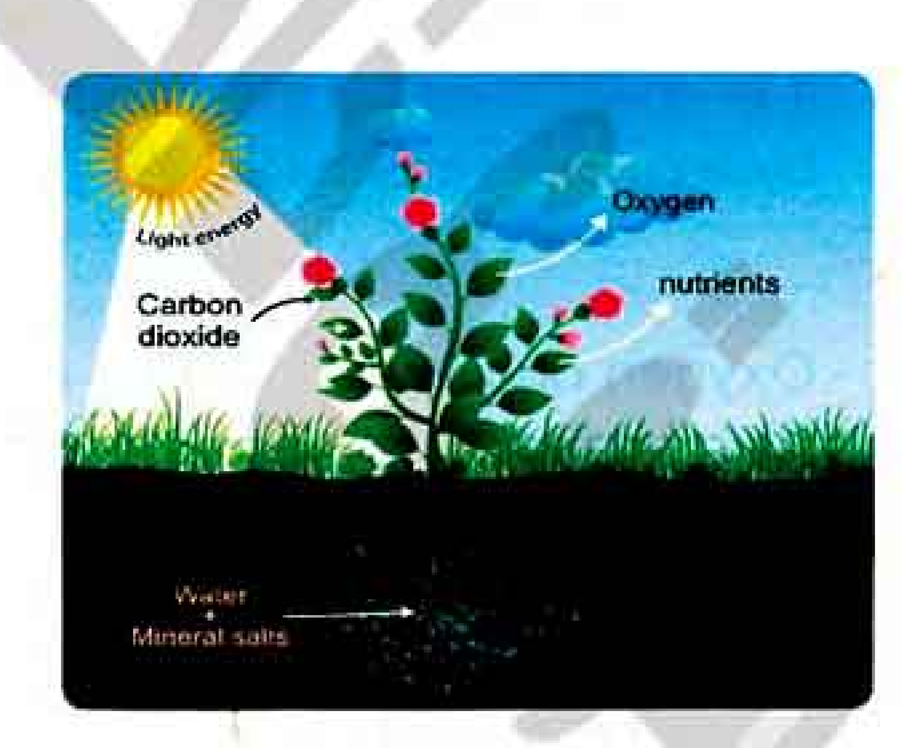


Green plants are the main source of oxygen gas. G.R.
Because green plants produce oxygen during photosynthesis process.



In photosynthesis process :

- The green plant takes :
  - Carbon dioxide gas (from the air).
  - Water and mineral salts (from the soil).
  - Sunlight (light energy).
- The green plant produces :
  - Nutrients.
  - Oxygen gas.



So, the percentage of oxygen gas (21%) in the atmosphere remains fixed although it is used in respiration and combustion processes.

molecule	جزئ	atom	ذرة	source	مصدر
photosynthesis process	عملية البناء الضوئى	mineral salts	أملاح معدنية	nutrients	الغذاء
combustion	إحتراق				





1 Lesson

G.R.

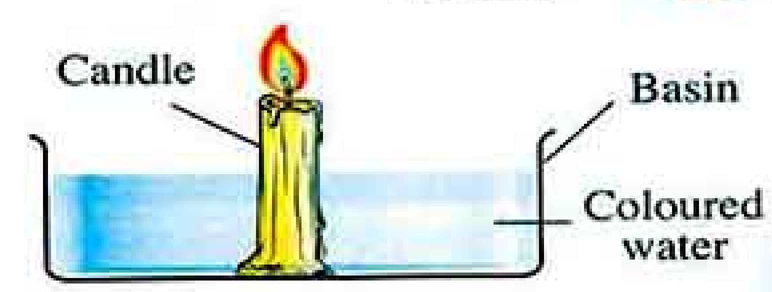
The percentage of oxygen gas in the atmosphere is fixed.
Because the consumed oxygen gas during respiration and combustion processes is compensated by the green plants during photosynthesis process.

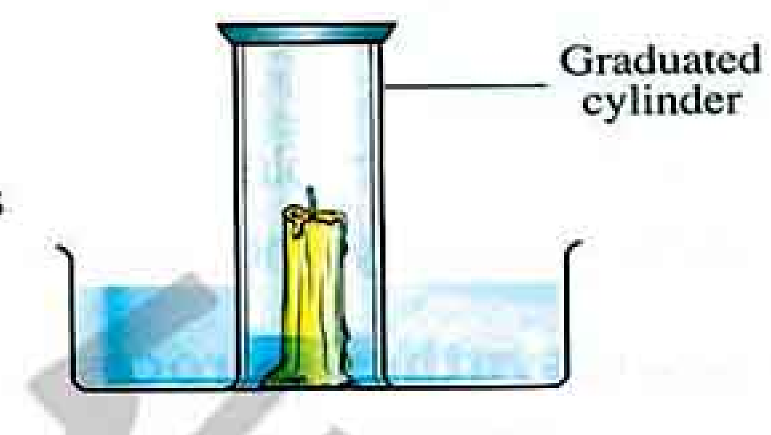
Activity 1 To prove that the percentage of oxygen gas equals 21% ($\frac{1}{5}$) of the air volume :



Steps:

1. Fix a lighted candle inside a basin containing coloured water.
2. Cover the candle with a graduated cylinder.
3. Determine the level of water inside and outside the cylinder.





Observation:

The lighted candle extinguishes and water rises inside the cylinder with one fifth of its volume.

Explanation:

Air inside the cylinder loses one of its components which is oxygen as it is consumed by the candle during burning, so water enters the cylinder by a ratio one fifth (21 %).

Conclusion:

Oxygen occupies one fifth (21%) of the air volume.



Exercise

Complete the following sentences :

1. *Oxygen gas represents .... of the atmosphere, while .... represents 78% of the atmosphere.*
2. *............. are the main source of oxygen gas on the Earth's surface.*
3. *Oxygen molecule consists of ....*

compensated يُعوض occupy يشغل determine عيّن، حدد level مستوى extinguishes ينطفئ



Preparation of oxygen in laboratory :

- Oxygen gas is prepared in laboratory by :

The decomposition of hydrogen peroxide (oxygen water) in the presence of manganese dioxide (as a catalyst) into water and oxygen gas.

Hydrogen peroxide $\xrightarrow[\text{Manganese dioxide}]{\text{Decomposition by}}$ Water + Oxygen gas.
(catalyst)

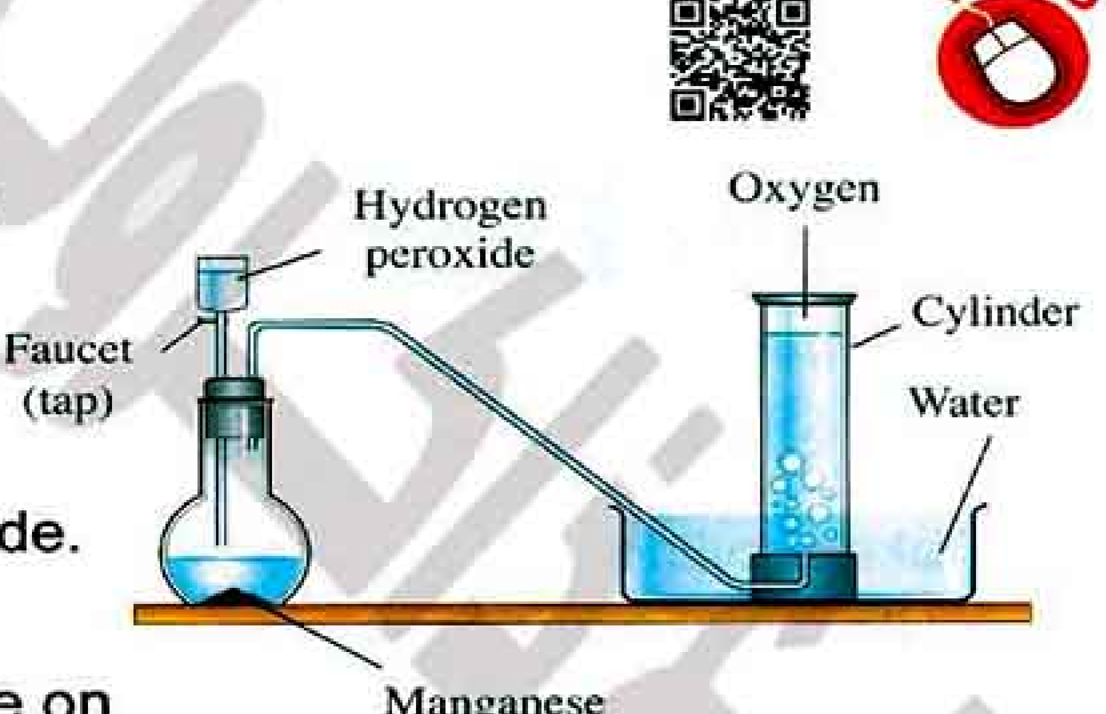
Catalyst :

It is a chemical substance that remains without any change in its quantity and properties during the chemical reaction.

Activity 2 To show the preparation of oxygen in laboratory:

Steps:

1. Set up the apparatus that is shown in the opposite figure.
2. Put an amount of manganese dioxide in the flask.
3. Fill the funnel with hydrogen peroxide.
4. Open the faucet (tap) to allow the leak of some hydrogen peroxide on manganese dioxide.



Observation:

The formation of a gas at the top of the cylinder.

Explanation:

- Oxygen gas replaces water in the cylinder by the "downward displacement of water". G.R.
- Because oxygen scarcely (rarely) dissolves in water.

decomposition	تحلل	leaking	تسرُب	funnel	قُمع	chemical reaction	تفاعل كيميائى
replaces	يحل محل	catalyst	عامل مساعد	downward displacement	إزاحة سُفلية	faucet	صنبور
apparatus	جهاز	properties	خصائص	quantity	الكمية	scarcely (rarely)	نادرًا / شحيح



Conclusion:

Hydrogen peroxide dissociates (decomposes) in the presence of manganese dioxide (as a catalyst) into water and oxygen gas.

Notes

1. Oxygen was discovered in China in 800 B.C, then it was re-discovered by **Joseph Priestley** in August 1774.
2. **Antoine Lavoisier** gave it the name "oxygen" in 1778.

Try to answer Test yourself 4

Properties of oxygen :

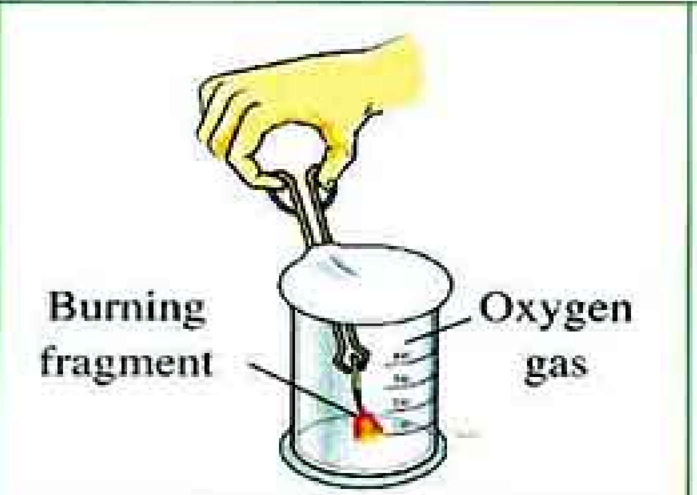
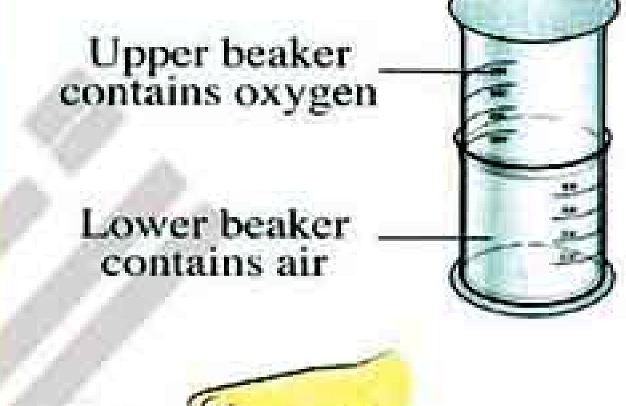
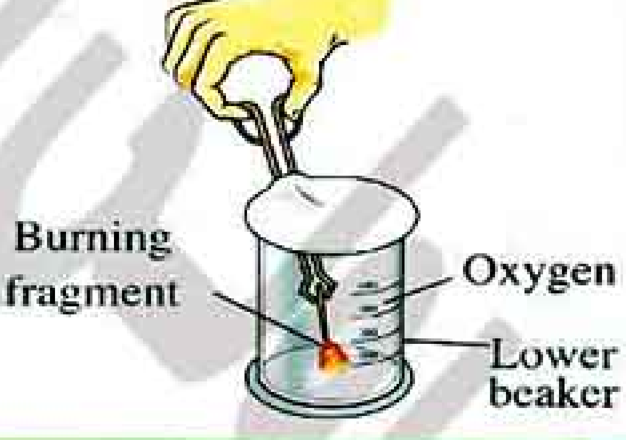
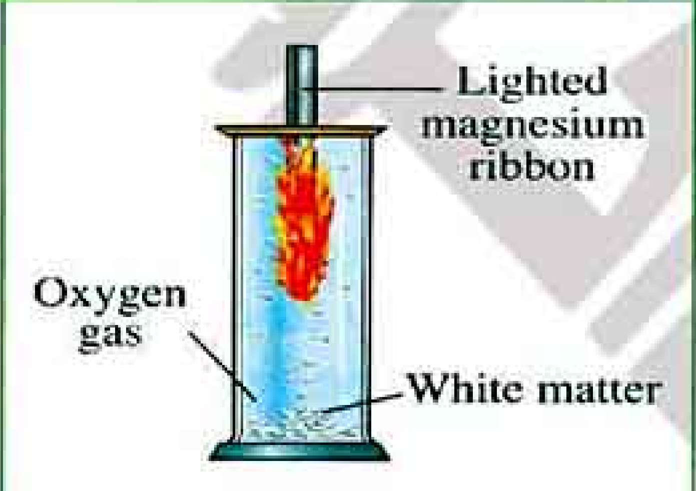
To explore the properties of oxygen gas, get glass beakers and cylinders filled with oxygen, then carry out the following activities :



Activity 3 To explore the properties of oxygen.

Steps	Figures	Observations
A Take a cylinder filled with oxygen and test its colour and smell.		It has no colour or smell.
B Turn a cylinder filled with oxygen upside down in a container filled with water.	Cylinder, Oxygen gas, Water	Very little amount of water rises in the cylinder and doesn't reach the normal level of water in the container.

dissociate / decompose ينحل | explore يكتشف | turn ..... upside down أقلب

Procedure	Figure	Observation
C Insert a burning fragment (burning match) in a beaker filled with oxygen.		The burning fragment is still burning.
D 1. Turn a beaker filled with oxygen over another beaker contains air. 2. Insert a burning fragment (burning match) in the upper beaker , then in the lower beaker.		The burning fragment is still burning in the lower beaker only. (Because oxygen replaces air in the lower beaker)
E Insert a lighted magnesium ribbon in a cylinder filled with oxygen.		A white matter is produced.
F Wet some iron nails with water and leave them for several days in a humid atmosphere.		The iron nails rust and lose their metallic luster.

humid atmosphere	جو رطب	rust	صدأ	magnesium ribbon	شريط ماغنسيوم
luster	لمعان، بريق	insert	إدخل	burning fragment	عود ثقاب مشتعل

1
Lesson

From the previous activities, we conclude that the properties of oxygen are :

1. Oxygen is a colourless, tasteless and odorless gas (as in activity A).

2. Oxygen scarcely dissolves in water (as in activity B).

3. Oxygen doesn't burn, but it helps in burning (as in activity C).

4. Oxygen is heavier than air so, it replaces air (as in activity D).

5. Oxygen combines with lighted magnesium to form magnesium oxide which is a white matter (as in activity E).

6. Oxygen has the ability to combine (unite) directly with most elements forming oxides (as in activities E & F).

The direct combination between oxygen and most of elements :

Element + Oxygen ⟶ Element oxide.

Oxygen combines with elements in two ways, which are :

1. **oxidation.**
2. **Burning (combustion).**

oxidation الأكسدة	combine (unite) يتحد	heavier اثقل
directly مباشرة	moisture رطوبة	

1 Oxidation :

"It is a slow combination between oxygen and element in the presence of moisture (water)".


Rusted ironware

Example : Iron rusting.

Problems of iron rusting (oxidation) :
Iron rusting causes corrosion and damage of ironware as bridges' pillars and ships' pillars.

A method to avoid iron rusting :
Isolating the ironware with paints to protect them from rusting.


Painted ironware



2 Burning (combustion) :

"It is a rapid combination (union) between oxygen and an element producing heat and light".


Burning wood

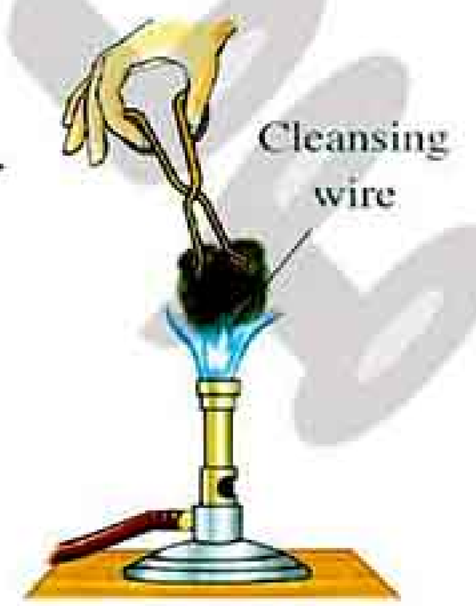
Example : Burning a piece of wood or a piece of cleansing wire.

Problems of combustion process :
The mass of an element increases after combustion.

Activity 4 To show that the mass of an element increases after combination with oxygen (combustion).

Steps:

1. Bring two balls of cleansing wire having the same mass.
2. By using a pair of tongs, put one ball on the flame.
3. When the inner part of the ball becomes red, put it on an aluminium plate until it extinguishes.
4. Compare between the mass of the burnt ball and the other ball by using a balance scale.



cleansing wire	سلك تنظيف	ironware	أجسام معدنية	bridges' pillars	هياكل الكبارى
tongs	ماشة / ملقط نار	paints	دهانات	corrosion	تآكل



Observation:

The mass of the burnt ball is heavier than that of the other unburnt ball.



Conclusion:

1. The mass of an element increases after combination with oxygen.
2. The cleansing wire burns quickly, because the outer surface of the wire is large enough to react with oxygen forming iron oxide.

G.R.

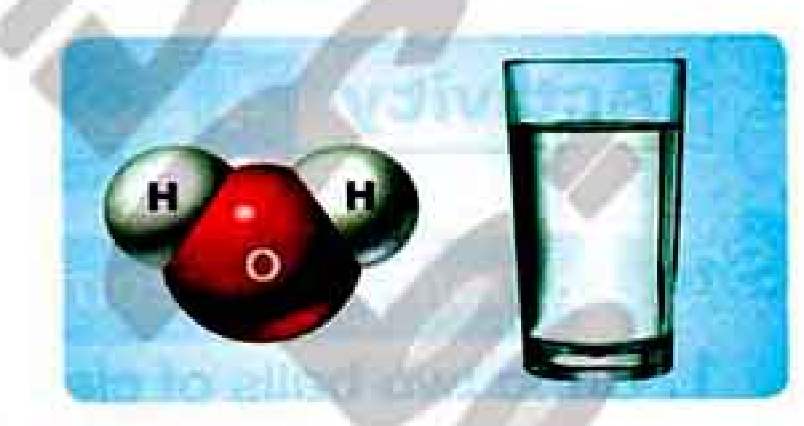
When you burn a ball of cleansing wire strongly, its mass increases.
Because oxygen combines with iron forming iron oxide whose mass is higher than that of iron only.

Importance and uses of oxygen :

1. Oxygen is important for human and all living organisms as it is used in :
   a. Respiration and combustion of food inside the living cells to produce energy necessary for all vital processes.



   b. Formation of water, where a water molecule (H_2O) is composed of one oxygen atom combines with two hydrogen atoms.



2. Oxygen gas forms the ozone layer in the atmosphere that protects the Earth from harmful radiations that come from the Sun. [Ozone molecule (O_3) is composed of three oxygen atoms]





3 Oxygen gas is compressed in iron cylinders to be used :

a. In mechanical ventilation for patients who suffer from breathing difficulties.

b. During surgeries.



c. During diving and climbing mountains. **G.R.**
Because oxygen is heavier than air, so its percentage decreases when we rise above the Earth's surface.



4 Oxygen combines with acetylene gas to produce oxy-acetylene flame, which is used for cutting and welding metals as its temperature rises to 3500°C.

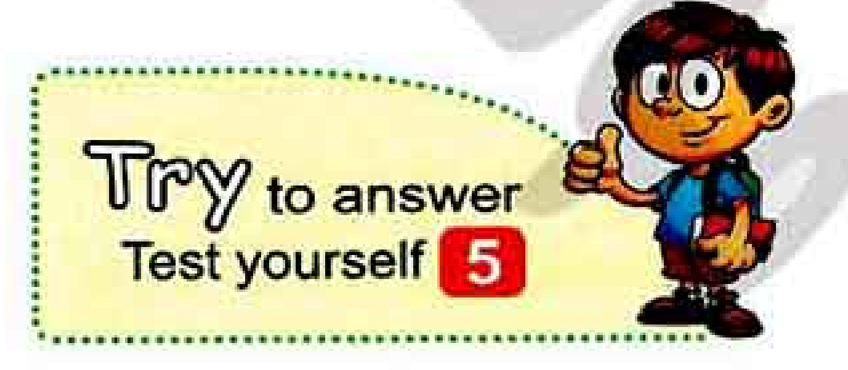
G.R.

- **Oxygen gas is compressed in iron cylinders.**

To be used :
- In mechanical ventilation.
- During surgeries.
- During diving and climbing mountains.

- **Ozone layer is very important for the life of all living organisms.**

Because it protects the Earth from harmful radiations that come from the Sun.



patient	مريض	compress	يضغط	mechanical ventilation	تنفس صناعى
diving	الغوص	suffer	يشكو	climbing mountains	تسلق الجبال
welding	لحام	surgeries	العمليات الجراحية		



Remember



- **Atmosphere is composed of:**
Nitrogen gas that represents 78% , oxygen gas that represents 21% and carbon dioxide gas, water vapour and other gases that represent 1%.

- Hydrogen peroxide $\xrightarrow[\text{manganese dioxide (catalyst)}]{\text{Decomposition by}}$ Water + Oxygen gas.

- Oxygen is a colourless, tasteless and odorless gas.

- Oxygen is collected by the downward displacement of water as oxygen rarely dissolves in water.

- Oxygen doesn't burn, but it helps in burning.

- Oxygen is heavier than air, so it replaces air.

- Oxygen combines with lighted magnesium to form magnesium oxide which is white matter.

- **Oxidation :** It is a slow combination between oxygen and element in the presence of moisture.

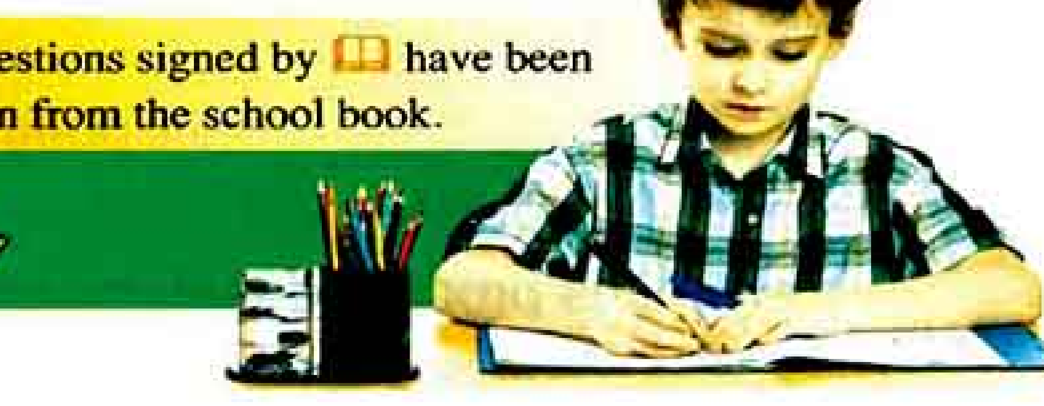
- **Burning (combustion) :** It is a rapid combination between oxygen and an an element producing heat and light.

- **Oxygen is used in:**
  - Respiration and combustion of food.
  - Formation of water.
  - Formation of ozone layer.
  - Mechanical ventilation, surgeries, diving and climbing mountains.
  - Cutting and welding metals as it forms oxy-acetylene flame.



Questions on lesson one

Questions signed by 📖 have been taken from the school book.



1. Choose the correct answer :

1. The percentage of oxygen gas in the atmosphere is .... (Assiut 2017)
   a. 12% b. 78% c. 21% d. 30%
2. The most abundant gas in the atmosphere is .... gas. (Giza 2017)
   a. oxygen b. nitrogen
   c. carbon dioxide d. water vapor
3. The least percentage in the atmosphere is a mixture of ....
   a. oxygen and carbon dioxide. b. carbon dioxide and argon.
   c. argon and helium.
   d. carbon dioxide, water vapour and other gases.
4. The atmosphere contains oxygen gas, nitrogen gas and carbon dioxide gas. What is the arrangement of these gases according to their ratio from the highest to the lowest ? .... (Ismailia 2012)
   a. Nitrogen, carbon dioxide and oxygen.
   b. Oxygen, nitrogen and carbon dioxide.
   c. Nitrogen, oxygen and carbon dioxide.
   d. Carbon dioxide, oxygen and nitrogen.
5. Which of the following gases is not one of the components of the atmospheric air ? .... (Alex. 2016)
   a. Oxygen b. Nitrogen c. Carbon dioxide d. Ammonia
6. The atmosphere protects the Earth, because ....
   a. it absorbs the infrared rays. b. it abosorbs ultraviolet radiations.
   c. it has oxygen gas.
   d. the presence of nobel gases as helium and argon in it.
7. The main source of oxygen gas in air is .... process. (Cairo 2014)
   a. photosynthesis b. respiration
   c. combustion d. digestion
8. Oxygen gas occupies about .... of the air volume. (Cairo 2012)
   a. $\frac{4}{5}$ b. $\frac{1}{5}$ c. $\frac{1}{4}$ d. $\frac{3}{4}$

9. .... are from the air pollutants.
   a. Dust particles b. Smoke
   c. Gases produced by factories d. (a), (b) and (c)
10. The respiration process and combustion of food need .... gas. *(South Sinai 2017)*
    a. oxygen b. nitrogen
    c. argon d. carbon dioxide
11. Photosynthesis process requires the presence of .... *(South Sinai 2017)*
    a. carbon dioxide gas. b. water and mineral salts.
    c. chloroplasts and light energy. d. (a), (b) and (c).
12. Oxygen gas exists in the atmosphere in a form of .... *(Sharkia 2017)*
    a. O b. O_2 c. O_3 d. O_4
13. Oxygen is produced from .... process.
    a. burning b. oxidation c. photosynthesis d. respiration
14. Respiration and combustion processes consume .... gas. *(Ismailia 2016)*
    a. oxygen. b. nitrogen. c. argon. d. carbon dioxide.
15. Hydrogen peroxide is used in preparing .... *(Kalyoubia & North Sinai 2017)*
    a. hydrogen gas. b. oxygen gas.
    c. nitrogen gas. d. carbon dioxide gas.
16. .... is used as a catalyst in the preparation of oxygen in lab. *(Cairo 2016)*
    a. Manganese oxide b. Manganese dioxide
    c. Hydrogen peroxide d. Magnesium oxide
17. The hydrogen peroxide is decomposed in the presence of manganese dioxide into .... *(Cairo & Suez 2017)*
    a. water and oxygen. b. water and hydrogen.
    c. oxygen and hydrogen. d. hydrogen and nitrogen.
18. .... gas doesn't burn, but it helps in burning.
    a. Oxygen b. Nitrogen c. Carbon dioxide d. Hydrogen
19. Oxygen is .... than air.
    a. heavier b. lighter c. colder d. hotter
20. Among the properties of oxygen, it is .... soluble in water. *(Dakahlia 2017)*
    a. scarcely b. rapidly c. easily d. non
21. When oxygen combined with an element, the mass of the product is .... the mass of the element. *(New Valley 2017)*
    a. more than b. less than c. equal d. (a), (b) and (c)



22. Oxygen combines with lighted magnesium forming white matter called ....
 a. magnesium oxide. b. iron oxide.
 c. manganese dioxide. d. hydrogen peroxide.

23. Ozone molecule is composed of .... oxygen atoms. *(Alex. 2017)*
 a. one b. two c. three d. four

24. The rapid combination between oxygen and elements producing heat and light is called .... *(Ismailia 2017)*
 a. burning. b. oxidation.
 c. respiration. d. reduction.

25. Water molecule consists of .... atoms
 a. one oxygen and two nitrogen. b. one oxygen and two hydrogen.
 c. two oxygen atoms. d. two hydrogen and one nitrogen.

26. .... gas is used with acetylene to weld metals. *(Suez & Alex. 2017)*
 a. Oxygen b. Nitrogen
 c. Hydrogen d. Carbon dioxide

27. Oxygen cylinders are used ....
 a. during surgeries. b. in diving.
 c. in climbing the mountains. d. (a), (b) and (c).

28. Oxy-acetylene flame is obtained as a result of combination between ....
 a. oxygen and hydrogen. b. acetylene and hydrogen.
 c. acetylene and nitrogen. d. acetylene and oxygen.

29. .... protects Earth from harmful radiations coming from the Sun.
 a. Oxygen gas b. Nitrogen gas
 c. Carbon dioxide gas d. Ozone layer

30. The temperature of oxy-acetylene flame reaches ....
 a. 35° C. b. 350° C. c. 3500° C. d. 200° C.

2. Put (✓) in front of the right statements and (×) in front of the wrong statements, then correct the wrong ones :

1. The atmosphere is attracted to the Earth by the effect of gravity. ( )
2. Oxygen molecule consists of three oxygen atoms. ( )
3. 📖 Oxygen gas is produced according to the availability of green plants during photosynthesis process. ( )
4. 📖 Oxygen gas occupies 78% of the atmospheric air components. *(Aswan 2017)* ( )

5. Carbon dioxide gas and other gases represent 1% of the volume of atmosphere. ( )
6. During photosynthesis process, the plant absorbs oxygen gas and produces carbon dioxide gas. ( )
7. Oxygen gas is prepared from hydrogen peroxide dissociates in the presence of carbon dioxide gas. *(Alex. & Fayoum 2017)* ( )
8. Manganese oxide acts as a catalyst in the preparation of oxygen. ( )
9. Nitrogen peroxide decomposes into water and nitrogen in the presence of manganese dioxide. ( )
10. Oxygen gas doesn't burn and doesn't help in burning. *(Luxor 2017)* ( )
11. Oxygen gas is heavier than air. ( )
12. Oxygen gas is colourless, tasteless and odorless. *(El-Kalyoubia 2013)* ( )
13. Oxygen gas easily dissolves in water. ( )
14. Oxygen combines with lighted magnesium ribbon forming a white substance. ( )
15. The mass of a material decreases after combination with oxygen. ( ) *(Alex. 2015)*
16. The erosion (rusting) of material which made of iron when exposed to moisture. ( )
17. Iron oxide results from the combination between iron and oxygen. ( )
18. The molecule of ozone gas consists of two oxygen atoms and symbolized by O_3. *(Qena & Matrouh 2016)* ( )
19. The molecule of ammonia gas consists of three oxygen atoms. ( ) *(Assiut 2016)*
20. Ozone layer protects the Earth from the harmful radiations coming from the Sun. *(Cairo 2012)* ( )
21. Oxygen cylinders are used during diving and climbing mountains. *(New Valley 2017)* ( )
22. Oxy-acetylene flame is used in welding and cutting metals. *(Cairo 2017)* ( )

3. Correct the underlined words :

1. The percentage of <u>nitrogen</u> in the atmosphere is 21%. (..............)
2. Water is composed of oxygen and <u>nitrogen</u>. (..............)
3. <u>Nitrogen</u> gas is essential to form rust. *(El-Minia 2016)* (..............)

4. Nitrogen gas is compressed in iron cylinders to be used during diving and climbing mountains. (...............)
5. Oxygen is prepared by downward displacement of air. (...............)
(El-Sharkia 2011)
6. Hydrogen peroxide dissociates in the presence of a catalyst to nitrogen and oxygen. *(Menofia 2017)* (...............)
7. When inserting a light magnesium ribbon in a cylinder filled with oxygen gas, a black substance is formed. *(El-Minia 2016)* (...............)
8. Carbon dioxide gas combined with acetylene to be used in cutting and welding metals. *(Red Sea 2017)* (...............)
9. The oxy-acetylene flame is used in cooking food. *(Alex. 2016)* (...............)
10. Ozone molecule is composed of two hydrogen atoms and one oxygen atom. (...............)
11. Oxygen molecule consists of three atoms. *(Gharbia 2017)* (...............)
12. Oxygen is produced during respiration process. (...............)
13. Ozone molecule is composed of two hydrogen atoms. (...............)
(Suez & Behiera 2017)

4. Write the scientific term of each of the following :

1. A mixture of different gases that surrounds the Earth's surface and attracted to it by gravity. *(Port Said 2016)* (...............)
2. The most abundant gas in the atmosphere. (...............)
3. The gas that forms 78% of the air volume. (...............)
4. The scientist that gave oxygen its name in 1778. (...............)
5. The gas that forms 21% of the volume of air. (...............)
6. The gas that represents one fifth of the volume of atmosphere. (...............)
7. The process during which the green plants absorb carbon dioxide gas in presence of light and make the nutrients for living organisms. (...............)
(Giza 2016)
8. A gas produced from green plants during photosynthesis process. *(Dakahlia 2017)* (...............)
9. A substance that remains without any change in its quantity and properties during the chemical reaction. *(Matrouh 2016)* (...............)
10. The product of combination of oxygen with lighted magnesium.(...............)

11. A flame whose temperature reaches 3500°C and used in cutting and welding metals. *(Menofia 2017)* (................)
12. A layer in the atmosphere that protects the Earth from harmful radiations coming from the Sun. *(Gharbia 2017)* (................)
13. Objects help in condensation of water vapour and falling rains. (................) *(Cairo 2011)*
14. A catalyst used in preparation of oxygen gas in laboratory. (................) *(Alex. 2013)*
15. A rapid union between oxygen gas and an element producing heat and light. (................)
16. A slow union between oxygen and an element in the presence of moisture. (................)
17. A chemical substance that decomposed into water and oxygen during the preparation of oxygen in laboratory. *(Sohag 2017)* (................)
18. A gas that is prepared from hydrogen peroxide. *(Port Said 2017)* (................)
19. A gas that its molecule is composed of three oxygen atoms. (................) *(Giza & Fayoum 2017)*
20. The gas that is consumed during respiration and combustion processes. (................)
21. The way by which oxygen gas is collected during its preparation in laboratory. (................)
22. A gas combines with oxygen to produce a flame whose temperature is sufficient to weld and cut metals. *(Gharbia 2017)* (................)
23. The product substance from the combination of magnesium and oxygen. *(Alex. 2017)* (................)
24. A flame that is used in cutting and welding metals. *(Damietta & Ismailia 2017)* (................)

5. Complete the following statements :

1. The atmosphere consists of a mixture of .... surrounding ....
2. The atmosphere is attracted to the Earth by the effect of ....
3. The percentage of oxygen gas in atmosphere equals .... *(Matrouh 2016)*
4. Carbon dioxide and other gases form .... % of the volume of the atmosphere.

5. Smoke and dust particles that present in the atmosphere help in the .... of water vapour and falling it in the form of .... or ....
6. .... gas is used in photosynthesis process and .... gas evolves from this process. *(Cairo & Kalyoubia 2015)*
7. Oxygen molecule consists of .... oxygen atoms, while .... molecule consists of three oxygen atoms.
8. The oxygen gas is produced plentifully from .... during .... process. *(Fayoum & Ismailia 2017)*
9. Oxygen gas of the atmosphere is consumed during .... and .... processes. *(Red Sea 2017)*
10. The green plants produce oxygen gas during the .... process and produce carbon dioxide gas during the .... process. *(Sharkia & Aswan 2017)*
11. Oxygen gas is prepared by the decomposition of .... in the presence of .... *(Dakahlia & Behiera 2017)*
12. During preparation of oxygen, hydrogen peroxide is dissociated into .... and ....
13. During the preparation of oxygen gas in the laboratory, oxygen is collected by the downward displacement of .... *(Cairo 2011)*
14. The catalyst remains without any change in its .... and .... during the chemical reaction.
15. .... was the scientist that gave oxygen gas its name in 1778.
16. Oxygen gas is scarcely soluble in ....
17. Oxygen gas is .... than air, so it can replace air.
18. .... doesn't burn, but helps in burning.
19. Oxygen gas combines directly with most elements forming ....
20. .... + lighted magnesium $\longrightarrow$ ....
21. The rapid combination between oxygen and elements producing heat and light is called .... *(Menofia 2017)*
22. The slow combination between oxygen and elements in the presence of moisture is called .... *(Menofia 2017)*
23. Iron combines with oxygen forming .... *(Dakahlia 2015)*
24. .... causes corrosion of ironware such as bridges' pillars.
25. Ironware must be isolated by .... to protect them from ....

26. The mass of the materials .... after combination with oxygen.
27. .... molecule consists of two hydrogen atoms and one oxygen atom. *(Damietta 2017)*
28. The .... layer protects the Earth from harmful radiation that comes from the Sun. *(Cairo 2014)*
29. .... and .... are from the uses of oxygen gas. *(Sohag 2016)*
30. .... gas can be compressed in .... that used for patients who suffer from breathing difficulties.
31. Oxygen is used in climbing mountains, because oxygen percentage .... when we rise above the Earth's surface.
32. Divers use .... cylinders during diving under water. *(Giza 2017)*
33. Oxygen combines with acetylene gas to produce ....
34. Oxy-acetylene flame is used for .... and .... of metals.
35. The temperature of oxy-acetylene flame rises to .... °C that is sufficient to melt metals.

6. Give reasons for the following :

1. Although oxygen is consumed during respiration, its percentage remains stable in the atmosphere. *(Cairo & El-Beheira 2016)*

   ....

   ....

2. Although smoke and dust particles are considered air pollutants, they have an important role in the formation of rains and snow. *(Sharkia 2015)*

   ....

3. The atmosphere has a great importance for the continuity of life on the Earth. *(Ismailia 2016)*

   ....

   ....

4. Oxygen is collected by downward displacement of water. *(Luxor 2017)*

   ....

5. Manganese dioxide remains without any change in its quantity and properties during the preparation of oxygen.

   ....

6. Manganese dioxide acts as a catalyst during the preparation of oxygen.
(El-Sharkia 2012)

....

7. When you turn a cylinder filled with oxygen over another cylinder filled with air, oxygen gas replaces the air in the lower cylinder.

....

8. A burning match is still burning when it is placed in a cylinder filled with oxygen.

....

9. When you burn a ball of cleansing wire strongly, its mass increases.
(El-Dakahlia 2012)

....

....

10. Rusting of iron has many disadvantages.

....

....

11. Corrosion of iron when it is not isolated from air.

....

....

12. Oxygen cylinders are used during climbing mountains. *(Cairo 2017)*

....

13. Oxy-acetylene flame is used for cutting and welding metals. *(Alex. 2011)*

....

14. Ozone layer is very important for the life of all living organisms.
(Sharkia & El-Minia 2017)

....

15. Divers use oxygen cylinders during diving under the water surface.

....

16. The pillars of the bridges are isolated from atmospheric air by paints.
(New Valley & Ismailia 2017)

....

7. Write the properties of oxygen gas.

....

....

....

....

8. What is meant by each of the following ... ?

1. The atmosphere.

....

2. The burning (combustion) process.

....

3. The oxidation process.

....

4. Catalyst.

....

9. Mention the importance of :

1. Ozone layer. *(Cairo & Kalyoubia 2017)*

....

2. Oxy-acetylene flame. *(Behiera & Fayoum 2017)*

....

3. Atmosphere. *(Damietta & Beni-Suef 2016)*

....

....

4. Manganese dioxide during the preparation of oxygen in the laboratory. *(Ismailia & Suez 2016)*

....

5. Hydrogen peroxide during the preparation of oxygen in the laboratory. *(Sharkia 2017)*

10. Explain how can you get oxygen gas from hydrogen peroxide.

....

....

11. Mention the importance and uses of oxygen gas ? *(Qena 2013)*

....

....

....

....

12. What happens when ...?

1. There is no atmosphere. *(El-Menofia 2012)*

....

....

2. There is no oxygen in the atmosphere. *(El-Beheira & Aswan 2016)*

....

3. Leaving iron nails in moist air for a long time. *(Beni-Suef & Sohag 2017)*

....

4. Ozone layer is decayed.

....

5. The percentage of oxygen gas in air is more than 21%.

....

6. A lighted magnesium ribbon is placed in a jar filled with oxygen.

....

7. The percentage of oxygen gas decreases in the atmosphere. *(Qena & South Sinai 2016)*

....

8. Putting a burning fragment in a cylinder filled with oxygen. *(Ismailia 2011)*

....

9. The mass of cleansing wire before and after heating. *(Port Said 2017)*

....

10. Hydrogen peroxide is dropped over manganese dioxide. *(El-Dakahlia 2011)*

....

....

11. The bridges' pillars are not isolated with paints.

....

13. Compare between oxidation process and burning process. *(Beni-Suef 2017)*

Points of comparison	Oxidation process	Burning process
1. Definition :	....	....
2. Example :	....	....

14. Look at the opposite figure, then write your observation and conclusion.

Observation :

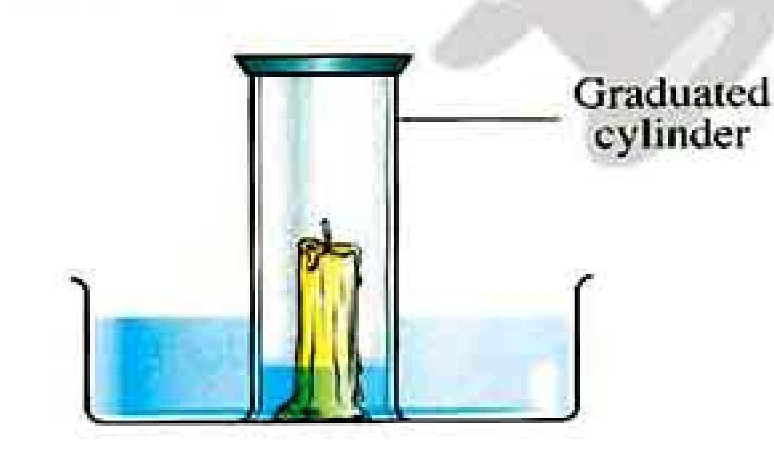
....

....

Conclusion :

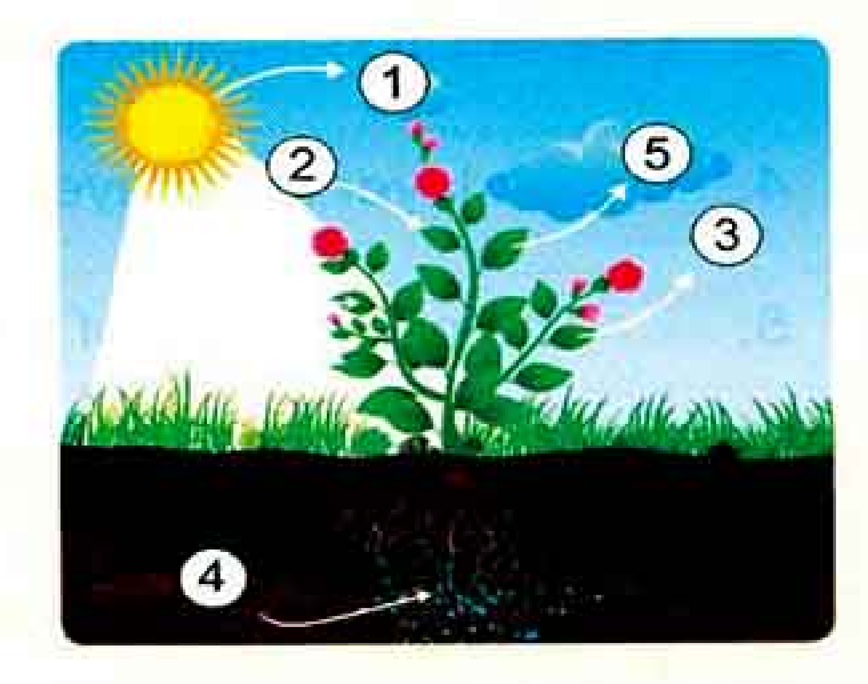
....

....



15. **Notice the following figure, then write the labels.** *(Aswan 2016)*

① ....
② ....
③ ....
④ ....
⑤ ....



16. **The shown apparatus represents the preparation of oxygen gas in laboratory.**

a. Write the labels indicated by the numbers. *(Giza & Alex. 2016)*

① .... ② .... ③ ....
④ .... ⑤ ....

b. 1. The produced gas is used in .... and ....

2. Oxygen is heavier than air, so its percentage ....

c. Write your observation on this activity.

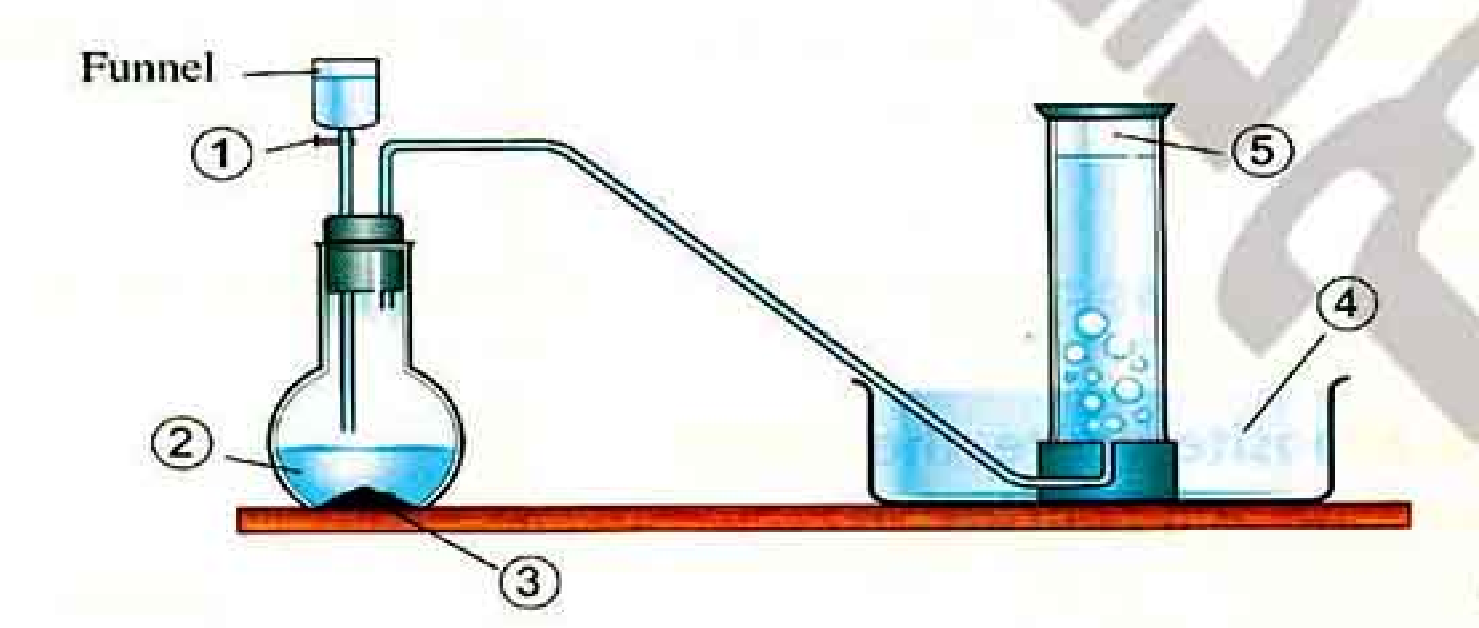
....

d. What is the importance of no. ③ ?

....

e. How is oxygen gas collected ? Why ?

....



Timss Questions



1. Look at the opposite two figures carefully, then answer the question under each figure :


Hydrogen atom


Oxygen atom




This figure represents a (an) .... molecule.


This figure represents a (an) .... molecule.


This figure represents a (an) .... molecule.

2. Why can a small fire be put out by placing a heavy blanket over it ?

a. Because this lowers the temperature.
b. Because this makes the flames smaller.
c. Because this absorbs the burning substance.
d. Because this keeps oxygen from reaching the fire.

3. Diagram 1 shows a container X that is filled with a material that could be a solid, liquid, or gas. The container has been closed with a glass sheet. Container X is placed upside down on an empty container Y, as shown in diagram 2.

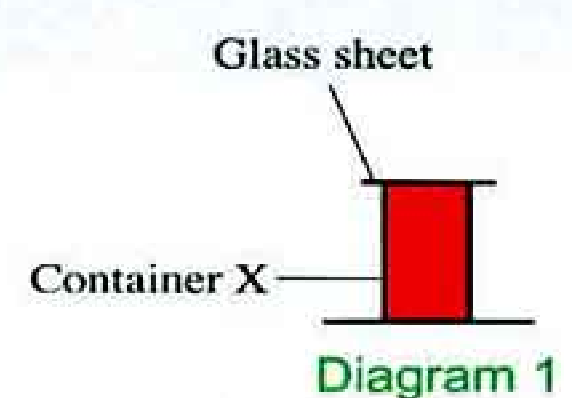


Diagram 1

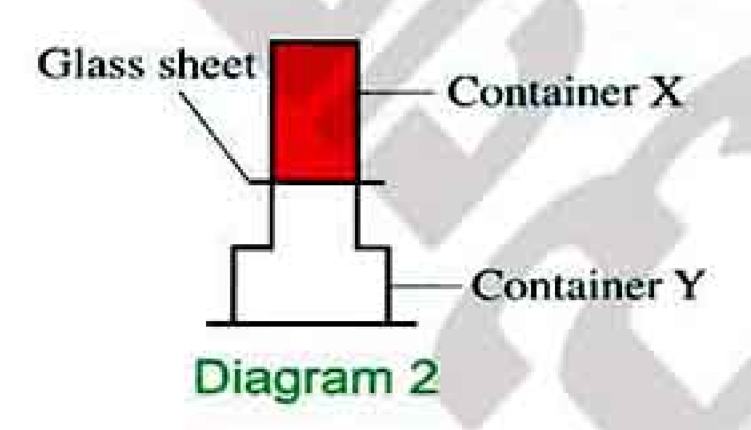
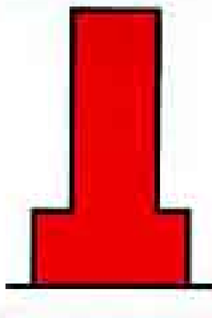
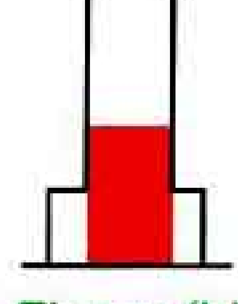


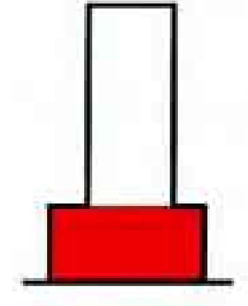
Diagram 2

The glass sheet is removed.

Which of the figures below shows what you would see if the material in container X is a gas ?

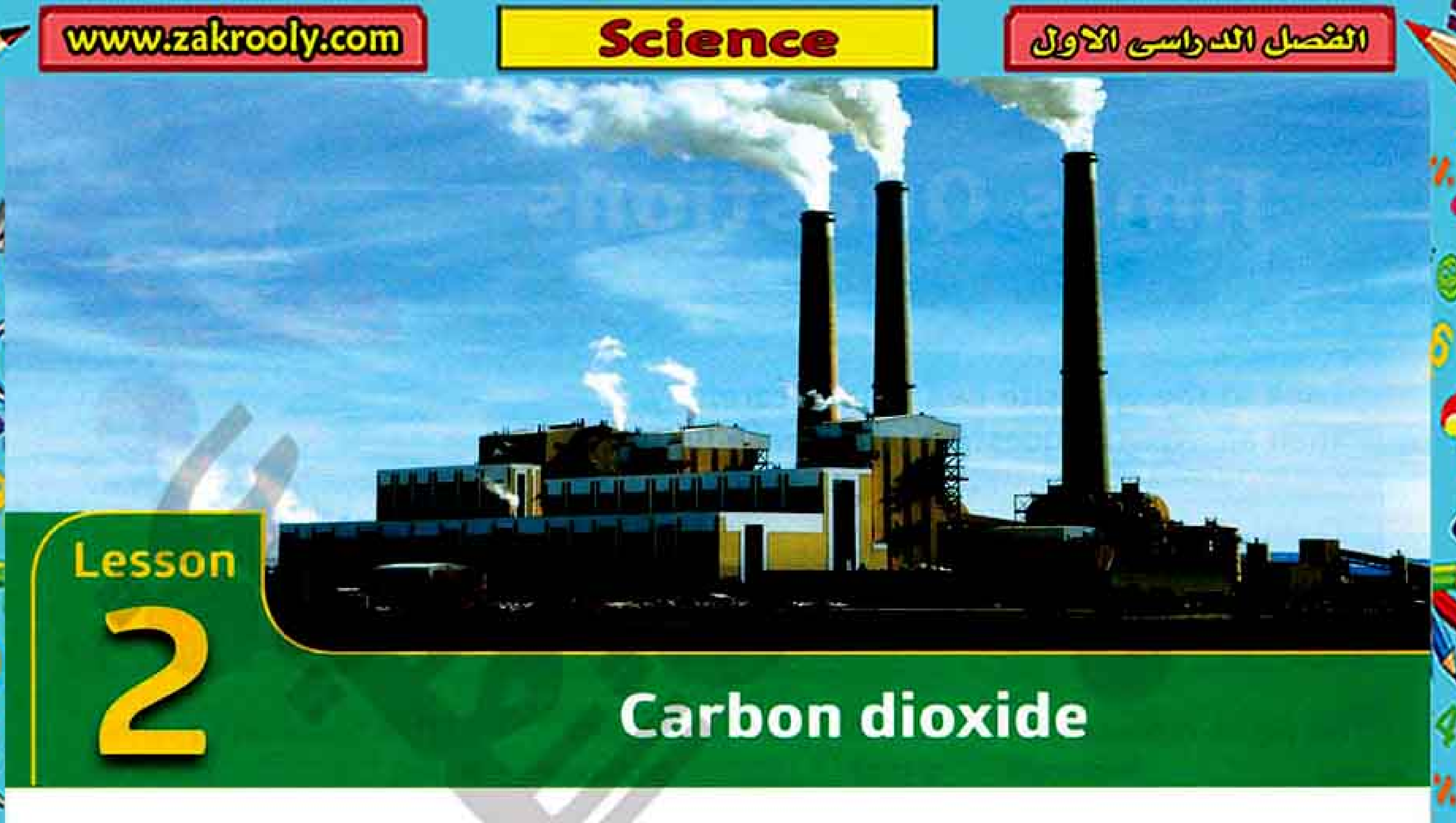

Figure (a)


Figure (b)


Figure (c)

Give reason for your answer.

....



Lesson 2

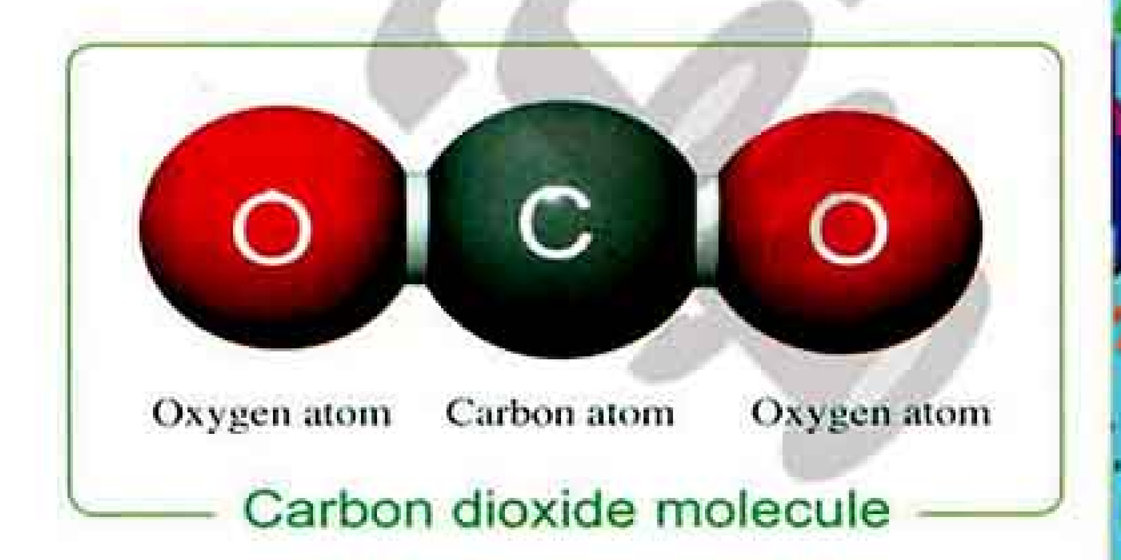
Carbon dioxide

In the previous lesson, you have studied that carbon dioxide forms about 0.03% of the volume of the atmospheric air.
Although the small percentage of carbon dioxide in air, it is necessary for green plants to make photosynthesis process to produce their own food and release oxygen.



Structure of carbon dioxide :

Carbon dioxide (CO_2) is a chemical compound whose molecule consists of one carbon atom linked with two oxygen atoms.



Carbon dioxide molecule

linked مُتحدة compound مُركب

Sources of carbon dioxide :

Carbon dioxide is produced from :

1. Respiration of all living organisms :

All living organisms take oxygen gas during inhalation process and produce carbon dioxide gas during exhalation process.


Human


Plant


Animal

2. Combustion of organic materials :

- Wood.
- Gasoline.
- Coal.
- Tobacco (the material of cigarettes)
- Oil.


Wood


Coal


Tobacco

3. Combustion of fuel in factories and means of transport :


Cars


Train


Factory

inhalation	الشهيق	organic materials	المواد العضوية	fuel	وقود
exhalation	الزفير	coal	الفحم	means of transport	وسائل المواصلات



2 Lesson

Activity 1 To prove that carbon dioxide gas is produced during exhalation (respiration) process.

(Clear limewater is used to detect the presence of carbon dioxide gas)




Steps:

1. Put an amount of clear limewater in a test tube.
2. Blow in limewater for two minutes using a juice straw.

Observation:

Clear limewater becomes turbid (milky).

Explanation:

- Clear limewater (Calcium hydroxide) turns into milky when carbon dioxide gas passes through it. G.R.
- Due to the reaction between them forming a white precipitate (ppt.) called calcium carbonate which is insoluble in water.

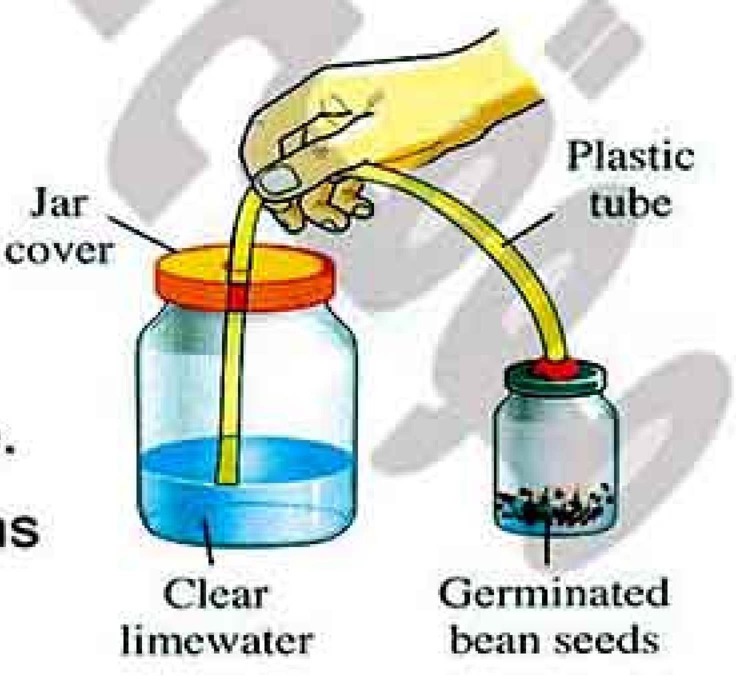
Conclusions:

1. Exhaled air contains carbon dioxide gas.
2. Carbon dioxide gas turbids the clear limewater.

Activity 2 To prove that carbon dioxide gas is produced during respiration of plants.

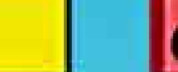
Steps:

1. Germinate some seeds of beans or peas in a jar on a wet cotton or wet sawdust.
2. Make a hole in the jar cover and insert a plastic tube through it as shown in the figure.
3. Insert the other end of the tube in a jar contains clear limewater and leave them for a while.



juice straw	ماصة عصير	turbid	معكر	germinate	يُنبت
precipitate	راسب	insoluble	غير ذائب		





Observation:
The clear limewater turns into milky (turbid).

Conclusion:
Carbon dioxide gas is produced during respiration of plants.

Activity 3 To prove that carbon dioxide gas is produced during combustion of organic materials as a candle.

Steps	Figures	Observations
1. Put a lighted candle in a cylinder , then cover the cylinder with a glass cover.	Glass cover Cylinder	After a while, the candle is extinguished.
2. Remove the glass cover and pour a little amount of clear limewater inside the cylinder and cover it again.	Limewater	Clear limewater turns into milky (turbid).

Conclusion:
Carbon dioxide gas is produced during combustion of organic materials as a candle.

Exercise

Choose the correct answer :

1. *A molecule of carbon dioxide consists of ....*
   - *a. two oxygen atoms.*
   - *b. three oxygen atoms.*
   - *c. one carbon atom linked with two oxygen atoms.*
   - *d. two nitrogen atoms.*
2. *Sources of carbon dioxide gas includes ....*
   - *a. Respiration of all living organisms only.*
   - *b. Photosynthesis process.*
   - *c. Combustion of organic materials only.*
   - *d. (a) and (c).*

combustion	إحتراق	extinguished	تنطفى
include	تتضمن / تشمل		



2 Lesson

Percentage of carbon dioxide :

- It represents 0.03% of the volume of atmosphere.

  But, its percentage increases due to :
  - The removal of forests.
  - Burning massive amounts of fuel in factories and means of transport.



Removal of forests

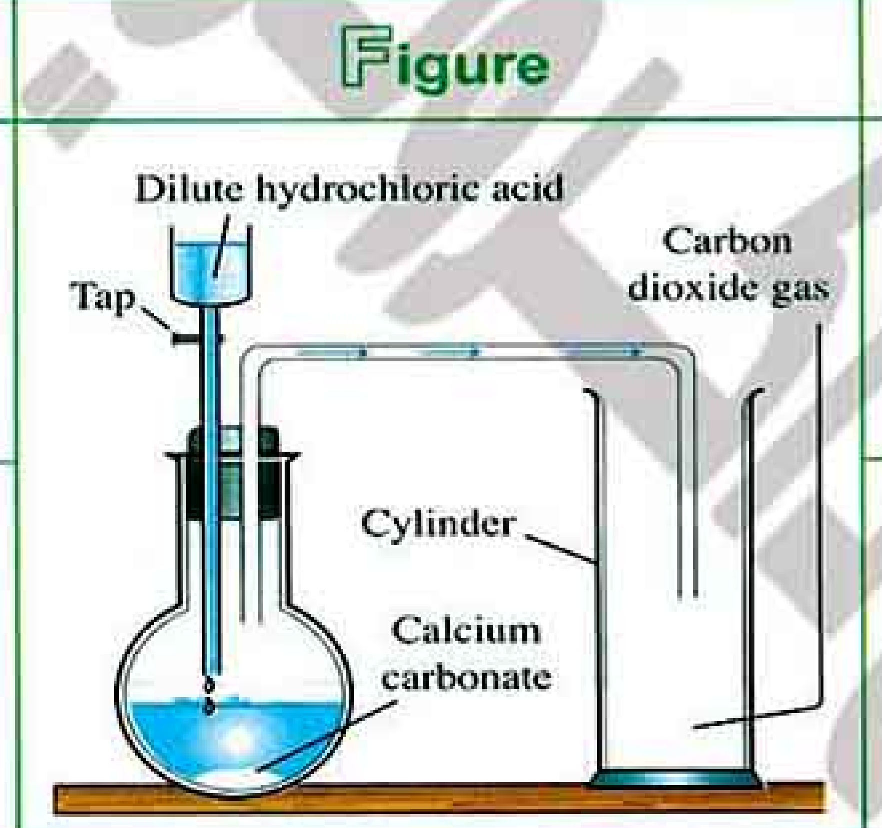

Burning of fuel in means of transport

Preparation of carbon dioxide (CO_2) in laboratory :

Carbon dioxide gas is prepared in laboratory by the reaction between dilute hydrochloric acid and calcium carbonate.

Activity 4 To show the preparation of carbon dioxide gas in laboratory.




Steps	Figure	Observation
1. Set up the shown apparatus as in the opposite figure.		
2. Pour some dilute hydrochloric acid on calcium carbonate that is found in the flask.		Carbon dioxide gas evolves, then passes in the tube to be collected in the cylinder.

Conclusions:

1. Carbon dioxide gas is prepared by adding dilute hydrochloric acid to calcium carbonate.
2. Carbon dioxide gas is collected by upward displacement of air, because it is heavier than air.
3. Carbon dioxide gas is not collected by displacement of water, because it easily dissolves in water.

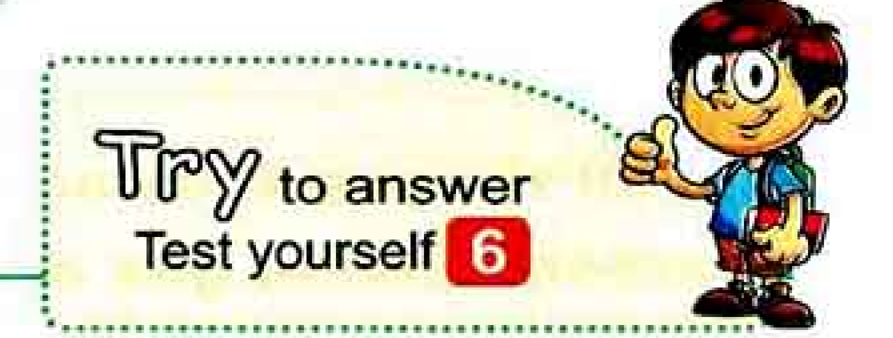
removal إزالة apparatus جهاز forests غابات massive amounts كميات كبيرة upward لأعلى



Carbon dioxide is collected by upward displacement of air not water.
Because carbon dioxide is heavier than air and easily dissolves in water.



Carbon dioxide gas is also prepared by adding lemon juice or vinegar to sodium bicarbonate (baking powder).



Properties of carbon dioxide (CO_2) :

To know the properties of carbon dioxide, take cylinders filled with carbon dioxide gas to do activities (A) and (B) :

Activity To show the properties of carbon dioxide gas.

Steps	Figures	Observations
(A) Turn a cylinder filled with CO_2 upside down on a lighted candle.	CO_2	The lighted candle will extinguish.
(B) Insert a lighted magnesium ribbon in a cylinder filled with CO_2	Magnesium ribbon; Carbon (black substance); Magnesium oxide (white powder)	Magnesium ribbon keeps burning for a short time, then extinguishes forming white powder and black substance that deposits on the wall of the cylinder.

adding إضافة deposits ترسب

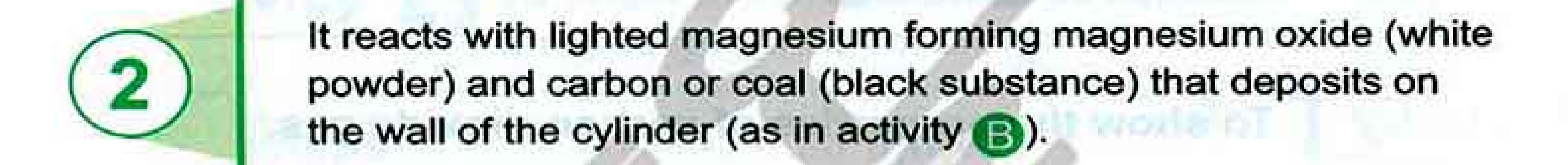


(C) Squeeze half a lemon on a beaker that contains a little amount of sodium bicarbonate.		Emission of carbon dioxide gas that has no colour or smell.

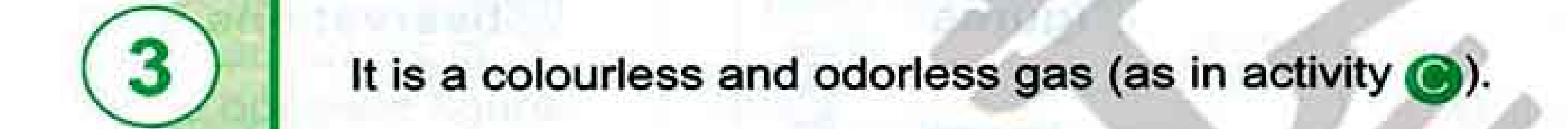
From all the previous activities, we conclude that the properties of carbon dioxide gas are :



1. It doesn't burn and doesn't help in burning, so, it is used in extinguishing fires (as in activity (A)).



2. It reacts with lighted magnesium forming magnesium oxide (white powder) and carbon or coal (black substance) that deposits on the wall of the cylinder (as in activity (B)).



3. It is a colourless and odorless gas (as in activity (C)).



4. It is heavier than air, so it is collected by upward displacement of air.

5. It easily dissolves in water, so it is not collected by displacement of water.

G.R.

Carbon dioxide gas is used in extinguishing fires.
Because carbon dioxide gas doesn't burn and doesn't help in burning.

squeeze أعْصر emission تصاعُد





Question

Complete the following sentences :

1. *We can get carbon dioxide gas, by adding dilute .... to ....*
2. *Carbon dioxide reacts with lighted magnesium forming .... and ....*
3. *.............. gas doesn't burn and doesn't help in burning.*
4. *Carbon dioxide is prepared by .... of air.*
5. *When adding lemon juice to sodium bicarbonate, ... gas is produced.*

Answer

1. *hydrochloric acid - calcium carbonate.*
2. *magnesium oxide - carbon.*
3. *carbon dioxide*
4. *upward displacement*
5. *carbon dioxide*

Disadvantages (harms) of carbon dioxide :

Increasing the percentage of carbon dioxide gas in air causes :

1. Suffocation of living organisms.



2. Increasing the temperature of the Earth's atmosphere and this phenomenon is known as global warming.

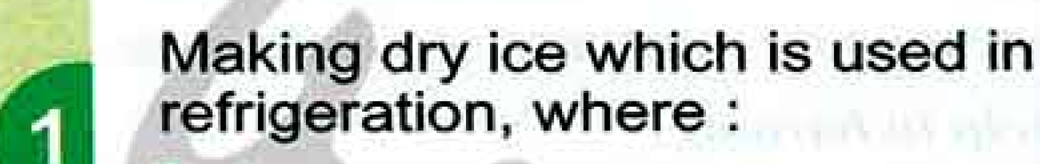


suffocation	إختناق	global warming	إحتباس حرارى
phenomenon	ظاهرة	disadvantages / harms	اضرار

Importance and uses of carbon dioxide :

Carbon dioxide gas is used in :

1. Making dry ice which is used in refrigeration, where :



Carbon dioxide gas $\xrightarrow[\text{and cooling}]{\text{by pressure}}$ Liquid $\xrightarrow[\text{pressure}]{\text{by relieving}}$ Dry ice.



2. Extinguishing some types of fires. **G.R.**
Because it doesn't burn and doesn't help in burning.



3. Making soft drinks.



4. Making bubbled bread.
(Where by adding yeast to dough, carbon dioxide is produced by fermentation process and expanded by heat making bread porous and tasty).



5. Photosynthesis process.
(Where by this process, green plants produce their food and oxygen which is necessary for respiration)



relieving	تخفيف	fermentation	التخمر	dough	عجائن
refrigeration	التبريد	porous	مسامي	dry ice	الثلج الجاف

Life application of carbon dioxide gas :


Soft drinks

- Scientists call soft drinks "the useless food", because it doesn't contain any nutrients except sugar.
- Drinking big quantities of soft drinks means that you swallow a big amount of carbon dioxide that causes osteoporosis (bone disease) and may cause death. G.R.

Because the amount of carbon dioxide increases in blood that leads to not getting the oxygen needed for vital processes of your body.

Enrichment information

1. Carbon dioxide is called the "silent killer", because we cannot see it, taste it or even smell it.
2. Breathing in a closed place (bad ventilated place) leads to a gradual decrease in oxygen , and an increase in carbon dioxide, so man gets suffocated and loses consciousness, then dies.

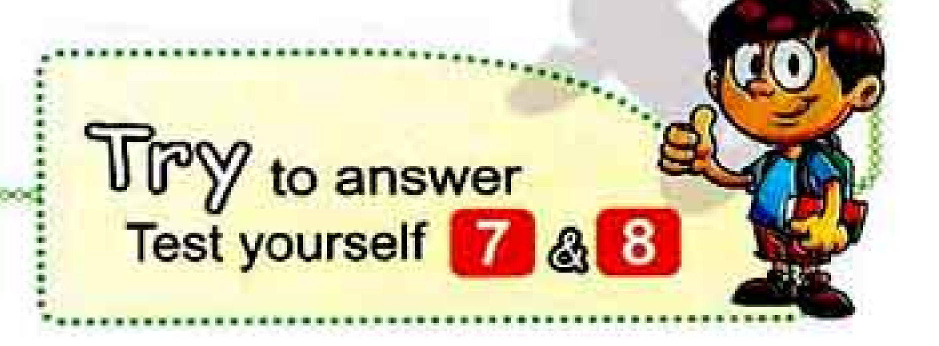
Question

Write the scientific term :

1. *The phenomenon of increasing the temperature of the Earth's surface as a result of increasing the percentage of carbon dioxide in air.* (..............)
2. *The process that results from adding yeast to dough and carbon dioxide gas is produced.* (..............)

Answer

1. *Global warming.*
2. *Fermentation process.*



killer	القاتل	bad ventilated	ردئ التهوية	osteoporosis	هشاشة عظام	gradual	تدريجى
consciousness	الوعى	useless	عديم الفائدة				





Remember

- Carbon dioxide gas (CO_2) represents 0.03% of the volume of the atmosphere.
- Carbon dioxide molecule consists of one carbon atom combines with two oxygen atoms.
- **Carbon dioxide is produced from:**
  - Respiration of all living organisms.
  - Combustion of organic materials and fuel.
- Carbon dioxide gas is prepared in the laboratory by adding dilute hydrochloric acid to calcium carbonate.
- Carbon dioxide is collected by upward displacement of air as it is heavier than air.
- Carbon dioxide doesn't burn and doesn't help in burning, so it is used in extinguishing fires.
- Carbon dioxide reacts with lighted magnesium forming magnesium oxide (white powder) and carbon or coal (black substance) that deposits on the wall of the cylinder.
- **Carbon dioxide is used in :**
  - Extinguishing some types of fires.
  - Making dry ice which is used in refrigeration.
  - Making soft drinks and bubbled bread.
  - Photosynthesis process.

Questions on lesson two

Questions signed by 📖 have been taken from the school book.

1. Choose the correct answer:

1. The percentage of carbon dioxide gas in air is ....
   a. 1%   b. 0.03%   c. 21%   d. 78%
2. Carbon dioxide molecule consists of ....
   a. one oxygen atom and two carbon atoms.
   b. one carbon atom and two nitrogen atoms.
   c. one carbon atom and two oxygen atoms.
   d. one carbon atom and one oxygen atom.
3. Carbon dioxide is produced as a result of combustion of ....
   a. wood.   b. oil.
   c. gasoline.   d. (a) , (b) and (c).
4. The gas which makes limewater turbid is .... *(Gharbia & Dakahlia 2016)*
   a. oxygen.   b. nitrogen.   c. carbon dioxide.   d. ozone.
5. The symbol of carbon dioxide is ....
   a. CO   b. CO_2 c. CH_4 d. C_2O_2
6. Carbon dioxide is produced from ....
   a. exhalation process.   b. photosynthesis process.
   c. burning of a candle.   d. (a) and (c).
7. Photosynthesis process depends on the presence of .... gas.
   a. oxygen   b. nitrogen   c. carbon dioxide   d. ozone
   (El-Kalyoubia & Giza 2013)
8. Combustion of .... is (are) from the resources of carbon dioxide gas.
   a. wood   b. tobacco
   c. gasoline   d. all the previous answers
9. Calcium carbonate is used in preparation of .... gas. *(Gharbia 2011)*
   a. hydrogen   b. oxygen   c. nitrogen   d. carbon dioxide
10. Carbon dioxide gas evolves by adding diluted hydrochloric acid to the powder of .... *(Menofia 2017)*
   a. calcium Carbonate.   b. calcium oxide.
   c. calcium hydroxide.   d. calcium Chloride.



11. Removal of forests leads to increasing the percentage of .... gas in air.
   a. nitrogen b. oxygen c. carbon dioxide d. hydrogen
12. Carbon dioxide gas is collected by ....
   a. upward displacement of air.
   b. upward displacement of water.
   c. downward displacement of air.
   d. downward displacement of water.
13. .... gas is prepared by adding dilute hydrochloric acid to calcium carbonate. *(Assiut 2017)*
   a. Oxygen b. Nitrogen c. Carbon dioxide d. Neon
14. Carbon dioxide gas is .... than air. *(Port Said 2017)*
   a. lighter b. heavier
   c. softer d. no correct answer
15. The gas that does not burn and does not help in burning is ....
   a. oxygen gas. b. carbon dioxide gas.
   c. hydrogen gas. d. (a) , (b) and (c).
16. We can't collect carbon dioxide gas by ....
   a. upward displacement of air. b. downward displacement of air.
   c. displacement of water. d. displacement of air.
17. We can extinguish fire using .... gas. *(Port Said 2012)*
   a. carbon dioxide b. oxygen
   c. nitrogen d. hydrogen
18. When the exhaled air passes through clear limewater, it becomes turbid forming substance called .... *(Damietta & Dakahlia 2017)*
   a. calcium chloride. b. calcium carbonate.
   c. sodium carbonate. d. calcium sulphate.
19. When a magnesium ribbon keeps burning for a short time in a cylinder containing CO_2 , it produces .... *(Gharbia 2017)*
   a. nitrogen. b. magnesium oxide.
   c. carbon. d. (b) and (c).
20. A gas which turns limewater into turbid is .... gas. *(Luxor 2016)*
   a. oxygen b. nitrogen c. carbon dioxide d. ozone
21. Adding lemon juice to sodium bicarbonate produces ....
   a. carbon dioxide gas. b. oxygen gas.
   c. nitrogen gas. d. (a) , (b) and (c).



22. When a glowing magnesium ribbon is inserted in a jar containing carbon dioxide gas, ... element deposits on the wall of the jar.
   a. magnesium   b. nitrogen   c. carbon   d. oxygen
   (Behiera & Sohag 2017)

23. Carbon dioxide is used in the industry of .... *(Damietta & Beni-Suef 2016)*
   a. steel.   b. gunpowder.
   c. fertilizers.   d. soft drinks.

24. By adding yeast to dough, ... is produced and expanded by heat, so it makes bread porous and tasty.
   a. oxygen gas   b. carbon
   c. carbonate   d. carbon dioxide gas

25. All the following are properties of carbon dioxide gas except ....
   a. it is a colourless and odorless gas.
   b. it rarely dissolves in water.
   c. it doesn't burn and doesn't help in burning.
   d. it is heavier than air.

26. Which of the following is from the uses of carbon dioxide gas ? ....
   a. Making dry ice.   b. Cutting and welding of metals.
   c. Formation of ozone layer.   d. Mechanical ventilation.

2. Choose from column (B) what suits it in column (A) :

(A)	(B)
1. Respiration process	a. is used to prepare limewater.
2. Calcium carbonate	b. CO_2
3. The reaction between calcium hydroxide and carbon dioxide	c. is opposite to photosynthesis process.
	d. is used to prepare carbon dioxide gas.
4. Carbon dioxide gas is symbolized by	e. forms calcium carbonate.
	f. C_2O

1. ....   2. ....   3. ....   4. ....

3. Put (✓) in front of the right statement and (×) in front of the wrong one, then correct it :

1. Carbon dioxide molecule consists of one carbon atom linked with two oxygen atoms. *(Dakahlia 2017)* (   )



2 Lesson

2. Carbon dioxide is important for plants to build their bodies and also make food for all living organisms. ( )
3. Increase of oxygen in air raises the temperature of the Earth's atmosphere. ( )
4. Oxygen is produced as a result of combustion of wood, tobacco and coal. *(Port Said 2015)* ( )
5. Combustion process and respiration of all living organisms are resources of carbon dioxide gas. ( )
6. Gasoline is the material that is used in making cigarettes. ( )
7. Oxygen is collected during its preparation in laboratory by upward displacement of air. *(El-Dakahlia 2011)* ( )
8. Limewater is used to detect the presence of nitrogen gas. ( ) *(El-Sharkia 2013)*
9. Passing carbon dioxide gas through clear limewater turns its colour into blue. ( )
10. When carbon dioxide gas passes through limewater, calcium carbonate is formed. ( )
11. Calcium carbonate is a chemical substance that is soluble in water. ( )
12. Carbon dioxide gas turbids the clear limewater. *(Kafr El-Sheikh 2016)* ( )
13. Exhaled air contains a large amount of carbon dioxide gas. ( )
14. Oxygen is produced from the respiration of bean seeds. ( )
15. Formation of a black ppt. when carbon dioxide gas is passed on a clear limewater. *(Red Sea 2016)* ( )
16. During photosynthesis process, the plant produces oxygen gas. ( )
17. Carbon dioxide is prepared by downward displacement of air. ( )
18. Dilute hydrochloric acid reacts with sodium chloride to produce carbon dioxide gas. ( )
19. Carbon dioxide gas is evolved due to the reaction between sodium bicarbonate and lemon juice. ( )
20. Carbon dioxide gas doesn't burn, and doesn't help in burning. ( ) *(South Sinia 2014)*
21. Air is heavier than carbon dioxide gas. ( )
22. Carbon dioxide scarcely dissolves in water. ( )
23. Carbon dioxide gas is used in making dry ice and soft drinks. ( ) *(Luxor & Aswan 2016)*

24. Carbon dioxide is used in extinguishing fires, because it helps in combustion. ( )
25. Yeast is added to dough to produce CO_2 which makes the bread porous and tasty. ( )
26. From the characteristics of oxygen gas, that it is a colourless and odorless gas, and easily dissolves in water. ( )

4. Write the scientific term of each of the following :

1. The gas that forms 0.03% of the volume of air. (...............)
2. A gas whose molecule consists of one carbon atom linked with two oxygen atoms. *(Port Said 2017)* (...............)
3. A gas that is used by the plant to make photosynthesis process. (...............) *(Suez 2016)*
4. The gas that raises the Earth's temperature when its percentage increases in air. *(Kalyoubia 2016)* (...............)
5. The material that is used in making cigarettes. (...............)
6. A chemical substance that is used to detect the presence of carbon dioxide gas. *(Alex. 2017)* (...............)
7. A gas that produced from respiration and comes out with exhalation process. (...............)
8. A chemical substance formed when carbon dioxide gas passes through clear limewater. (...............)
9. A chemical substance added to calcium carbonate during the preparation of carbon dioxide gas. (...............)
10. The method that is used to collect carbon dioxide gas during its preparation. (...............)
11. A gas that the increase in its percentage causes global warming. (...............) *(Ismailia 2011)*
12. A phenomenon occurs due to the increase in the percentage of carbon dioxide gas in air which raises the Earth's temperature. *(Menofia 2017)* (...............)
13. It is produced as a result of the reaction between lemon juice and sodium bicarbonate. (...............)
14. A gas that doesn't burn and doesn't help in burning. (...............)
15. The gas that is heavier than air and easily soluble in water. (...............)
16. The gas that turns limewater into turbid. *(North Sinai 2017)* (...............)

17. A black substance deposits on the wall of a cylinder when putting a lighted magnesium ribbon in the cylinder filled with carbon dioxide gas. (................)
18. A gas that is used in making soft drinks and dry ice. *(Assiut 2017)* (................)
19. A gas that is used in extinguishing fires. *(Fayoum & Aswan 2016)* (................)
20. It is added to dough to produce carbon dioxide gas during fermentation process. (................)
21. A gas that causes suffocation for living organisms. *(Kafr El-Sheikh 2017)* (................)
22. The process that results from adding yeast to dough and carbon dioxide gas is produced. *(Giza 2015)* (................)

5. Complete the following statements :

1. The percentage of carbon dioxide gas in atmospheric air is .... and has the symbol of .... *(Suez 2017)*
2. Carbon dioxide molecule consists of one .... atom linked with two .... atoms. *(Cairo 2017)*
3. Carbon dioxide which is produced from .... and .... turbids the clear limewater. *(Ismailia 2011)*
4. .... is a chemical substance used to detect the presence of carbon dioxide gas in air.
5. Carbon dioxide gas is produced as a result of the combustion of .... substances such as .... and also produced from .... of living organisms. *(El-Minia & Aswan 2016)*
6. In photosynthesis process, the plant absorbs .... gas and produces .... gas, while in respiration process .... gas is consumed and .... gas is produced.
7. .... gas is very important in photosynthesis process of green plants.
8. During respiration of bean seeds, ... gas is produced.
9. Exhaled air contains a large amount of .... gas. *(Cairo 2012)*
10. Carbon dioxide turns the clear limewater into ....
11. Limewater turns into milky in the presence of .... due to the formation of .... which insoluble in water. *(Port Said 2017)*
12. Removal of forests leads to the increase in the ratio of .... gas in air.
13. Combustion of big amounts of .... in factories and means of transportation leads to increasing the percentage of .... gas in air.



14. Carbon dioxide gas is prepared in laboratory by dropping .... over .... *(Alex. 2017)*
15. .... gas can be obtained on adding dilute hydrochloric acid to calcium carbonate. *(Damietta & Beni-Suef 2016)*
16. Carbon dioxide gas is collected by .... displacement of .... as it is .... than air. *(Alex. 2015)*
17. Carbon dioxide gas is not collected by displacement of water, because it is ....
18. .... and .... are from the properties of carbon dioxide gas.
19. On putting a lighted magnesium ribbon in a cylinder filled with CO_2, a white substance of .... is formed and .... deposits on the wall of the cylinder.
20. Increasing the percentage of carbon dioxide in air causes .... and ....
21. Carbon dioxide gas is used in extinguishing fires as it doesn't .... and doesn't ....
22. 📖 Carbon dioxide gas is changed by .... and .... to, liquid then pressure is relieved composing .... which is used in refrigeration. *(Menofia & Beni-Suef 2017)*
23. .... gas is used in making soft drinks. *(Aswan 2013)*
24. Yeast is added to dough to produce .... which makes the bread .... and ....
25. Green plants use .... gas to make photosynthesis process to produce .... and ....
26. .... gas is used in refrigeration, while .... gas is used in welding metals. *(Assiut & Suez 2013)*

6. Give reasons for the following :

1. 📖 Clear limewater is used to detect the presence of carbon dioxide gas. *(Red Sea 2013)*

 ....

2. Carbon dioxide gas is collected by upward displacement of air. *(Cairo 2016)*

 ....

3. Carbon dioxide gas is not collected by downward displacement of water. *(Gharbia 2016)*

 ....



2
Lesson

4. Clear limewater gets turbid if carbon dioxide passes through it. *(Cairo & Behiera 2017)*

....

....

5. Increasing the percentage of carbon dioxide gas in air is dangerous.

....

....

6. Burning a magnesium ribbon in the presence of carbon dioxide gas produces white and black substances.

....

....

7. Decreasing the green areas harm the environment. *(Suez 2017)*

....

8. Carbon dioxide is used in extinguishing some fires. *(Giza & North Sinai 2017)*

....

9. Yeast is added to dough on making bread. *(Beni-Suef 2017)*

....

....

10. Photosynthesis process is important for plants and all living organisms.

....

....

11. In last years, the environment is suffered from increasing of the percentage of carbon dioxide. *(Gharbia 2017)*

....

....

12. Carbon dioxide gas has a great vital importance in life continuity on the Earth's surface. *(Kafr El-Shiekh 2013)*

....

....

13. Cutting forests leads to the increase in the percentage of carbon dioxide gas in nature.

....

....

14. Carbon dioxide gas has many benefits.

....

....

7. What happens if ...?

1. One carbon atom linked with two oxygen atoms.
....
2. You blow in a jar contains clear limewater. *(Giza 2017)*
....
3. Dilute hydrochloric acid is dropped over calcium carbonate. *(Dakahlia 2016)*
....
4. Most forests on the Earth are removed.
....
....
5. 📖 The percentage of carbon dioxide gas in air increases. *(Cairo & Damietta 2017)*
....
....
6. 📖 The percentage of carbon dioxide in air decreases. *(Cairo 2016)*
....
....
7. A lighted candle is put in a cylinder filled with carbon dioxide gas. *(El-Kalyoubia 2011)*
....
8. A lighted magnesium ribbon is inserted in a cylinder filled with CO_2 *(Ismailia 2017)*
....
....
9. Lemon juice reacts with sodium bicarbonate.
....
10. The pressure on liquefied carbon dioxide is relieved.
....
11. Yeast is added to dough during making bread. *(Behiera 2017)*
....
12. Drinking big quantities of soft drinks. *(Kalyoubia & Menofia 2017)*
....



2
Lesson

8. Write your observation and conclusion in the following activity :

- Observation : ....
....
- Conclusion : ....
....

Clear limewater
Germinated bean seeds

9. Compare between oxygen gas and carbon dioxide gas according to their properties. (Three points only)

Oxygen gas	Carbon dioxide gas
....	....
....	....
....	....
....	....

10. What is the importance of ...?

1. Carbon dioxide gas.
....
....

2. Limewater. *(Kalyoubia & Dakahlia 2016)*
....
....

3. Dry ice. *(Dakahlia 2017)*
....
....

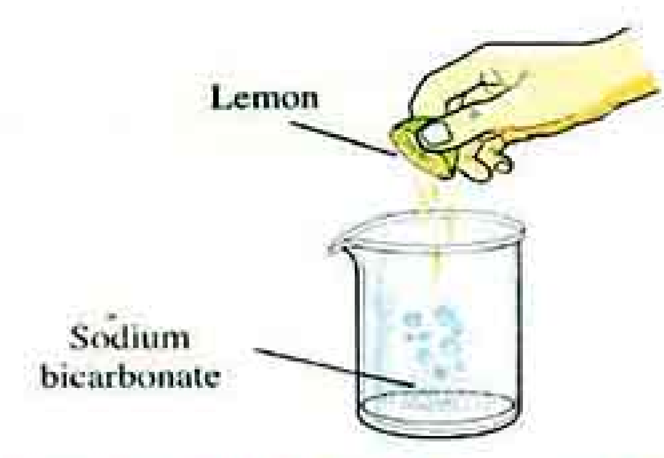
4. Yeast in making bread. *(Ismailia 2017)*
....
....

11. How can you obtain carbon dioxide gas from :

a. Calcium carbonate.
....
....

b. Wood.
....

12. **Look at the opposite figure, then mention the evolved gas.**



....

13. **Mention the importance of carbon dioxide gas for all green plants.** *(Sohag 2011)*

....

....

14. **Look at the following figure, then answer :** *(Giza & Fayoum 2017)*

a. Write what represents each label on the figure :

– Liquid (1) : ....

– Substance (2) : ....

b. Mention three uses for the evolved carbon dioxide gas :

1. ....
2. ....
3. ....

c. Carbon dioxide is collected by upward displacement of air. Why ?

....



Timss Questions



1. When you light up a candle, it ....

a. produces oxygen and carbon dioxide.
b. consumes oxygen and carbon dioxide.
c. consumes oxygen and produces carbon dioxide.
d. produces oxygen and consumes carbon dioxide.

2. The amount of carbon dioxide in the air is increasing in Cairo due to the growing number of cars. The governorate wants to plant more trees.

Do you agree with the governorate's suggestion ?

(Check one box)

Yes

No

Explain your answer.

....

....

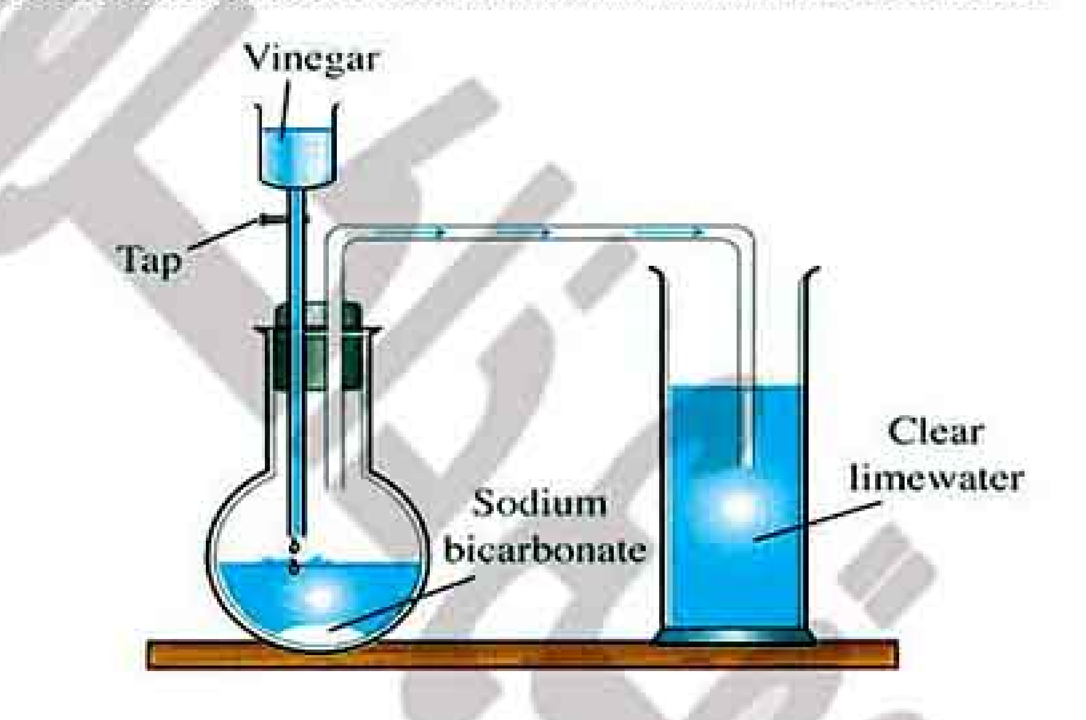
3. 1. When you open the tap, vinegar reacts with sodium bicarbonate producing .... gas.

2. What happens to the clear limewater in the cylinder ?

....

....

3. When carbon dioxide reacts with clear limewater a white substance is produced known as ....



4. After a while in this activity :

1. The candle will .... because it consumes the .... gas.

2. Limewater turns into .... due to the passage of .... gas through it.

3. This activity proves that .... process produces .... gas.





Lesson 3

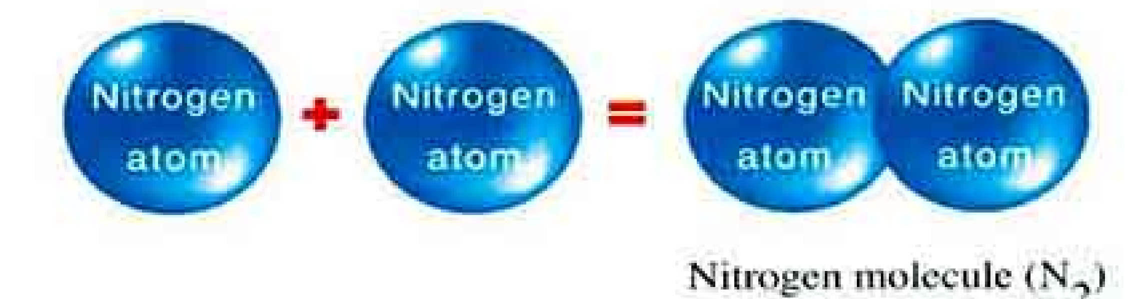
Nitrogen

- Nitrogen represents 78% of the volume of the atmospheric air, So it is the most abundant gas in the air.
- The atmospheric air is considered the main source of nitrogen.
- The scottish scientist **Daniel Rutherford** had discovered nitrogen in 1772.

Daniel Rutherford

Structure of nitrogen :

- Nitrogen is found in nature in the form of a gas.
- Nitrogen is an element whose molecule is referred to by the symbol (N_2) , because its molecule is composed of two nitrogen atoms.



Nitrogen molecule (N_2)

abundant وافر scottish اسكتلندى

3 Lesson

The existence of nitrogen :

Nitrogen exists

1 In atmospheric air :

Nitrogen represents **78%** of the volume of the atmospheric air.

78%

2 In soil :

Nitrogen reacts with oxygen during lightning forming **nitrogen oxide** that reaches soil during raining.

Oxygen + Nitrogen ⟶ Nitrogen oxide





3 In legumes :

such as clover, peas and soybeans where, a specific type of bacteria (nodular bacteria) live in their roots and take the atmospheric nitrogen to form proteins.



4 In all the living tissues :

It forms protein substance that builds up the body of all living organisms.

existence	وجود	lightning	البرق	legumes	بقوليات	soybeans	فول صويا
soil	تربة	nodular bacteria	بكتريا عُقدية	clover	برسيم	peas	بسلة

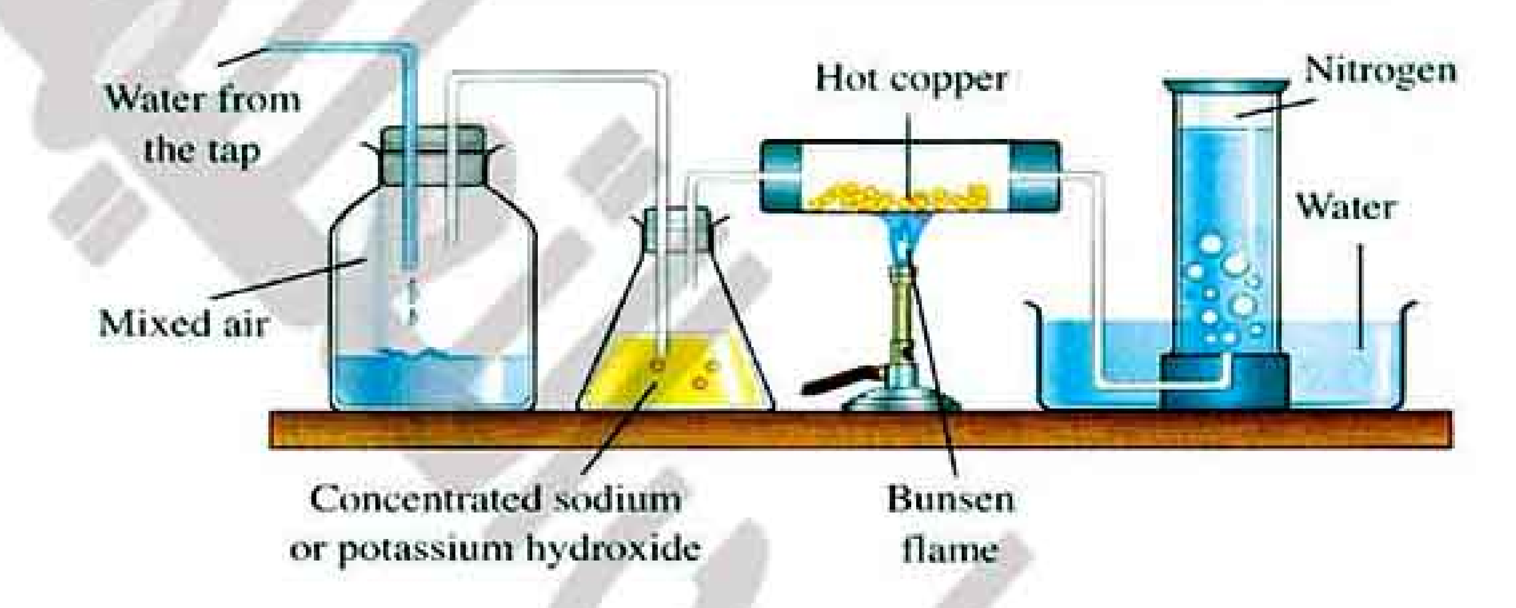


Preparation of nitrogen in laboratory :

Nitrogen is prepared in the laboratory from the atmospheric air by the removal of both carbon dioxide gas and oxygen gas, then nitrogen gas is collected.

Activity 1 To show the preparation of nitrogen from the atmospheric air.



Steps:

1. Set up the apparatus as shown in the figure.
2. Open the water tap to push the air inside the first flask.
3. Let the air pass through a solution of concentrated sodium hydroxide or potassium hydroxide (to absorb the small amount of carbon dioxide from the air).
4. Let the air pass over hot copper (to remove oxygen from the air by combining with it).

Observation:

Formation of a gas at the top of the cylinder, where it displaces water downwards.

Conclusions:

1. Nitrogen gas is prepared from the atmospheric air by passing it through a solution of concentrated sodium hydroxide or potassium hydroxide, then hot copper.
2. Nitrogen gas is collected by downward displacement of water, because it is scarcely soluble in water.

removal	إزالة	concentrated	مُركز
displaces	يُزيح	flask	قارورة

3 Lesson



1. During the preparation of nitrogen, air is passed through concentrated sodium or potassium hydroxide.
To absorb the small amount of carbon dioxide gas from air.

2. Nitrogen is collected by downward displacement of water.
Because nitrogen is scarcely soluble in water.

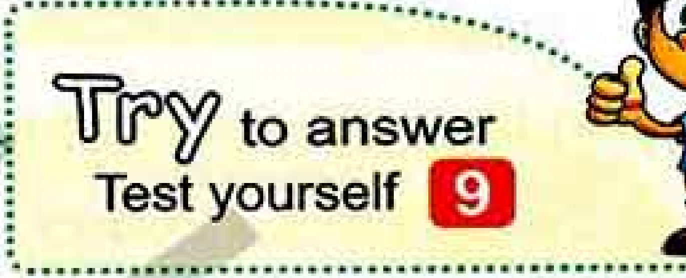
Question

Choose the correct answer :

1. *Nitrogen is prepared from air by ....*
   a. *removing oxygen from air.* b. *removing nitrogen from air.*
   c. *removing carbon dioxide from air.* d. *(a) and (c).*
2. *The percentage of nitrogen gas in air is ....*
   a. *60 %* b. *78 %* c. *87 %* d. *84 %*

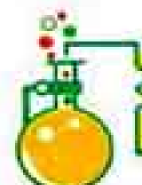
Answer

1. d. (a) and (c). *2. b. 78 %*



Properties of nitrogen :

To know the properties of nitrogen, get cylinders or test tubes filled with nitrogen gas to do the following activities :



Activity 2 To prove that nitrogen gas doesn't help in burning.

Step:
Put a lighted match close to the opening of a test tube filled with nitrogen.

Observation:
The lighted match is put out.

Match

Nitrogen gas



Conclusion:
Nitrogen gas doesn't help in burning.







Activity 3 To prove that nitrogen reacts with lighted magnesium ribbon producing ammonia gas.

Steps	Figures	Observations
1. Insert a lighted magnesium ribbon in a cylinder filled with nitrogen.	Lighted magnesium ribbon; Nitrogen gas; White substance	- A white substance is produced.
2. Add a little amount of water to the produced white substance.	Ammonia gas; Water; White substance	- A very pungent smell emits.

Conclusion:

- Nitrogen reacts with a lighted magnesium ribbon producing a white substance that reacts with water producing ammonia gas (has a very pungent smell).
  - Nitrogen + Lighted magnesium ribbon ⟶ White substance
  - White substance + Water ⟶ Ammonia gas

G.R.

- **On putting a lighted match in a cylinder filled with nitrogen, the match is put out.**
  Because nitrogen gas doesn't help in burning.
- **A pungent smell is evolved as a result of adding water to the product of burning magnesium in nitrogen.**
  Due to the formation of ammonia gas which has a very pungent smell.

lighted magnesium ribbon شريط ماغنسيوم مشتعل | pungent smell رائحة نفاذة | ammonia gas غاز النشادر



3
Lesson

From all the previous activities, we conclude that the properties of nitrogen gas are :

1. It scarcely dissolves in water.
2. It is a colourless, tasteless and odorless gas.
3. It doesn't help in burning (as in activity 2).
4. It is called "azote" which means lifeless gas.
5. It combines with lighted magnesium ribbon forming a white substance that reacts with water forming ammonia gas which has a pungent smell (as in activity 3).
6. It can be condensed into a liquefied state.
7. It doesn't easily react with a lot of elements as it is inactive element.

G.R.

Nitrogen gas is called azote.
Because it doesn't help in burning.

lifeless	عديم الحياة	inactive	غير نشط	liquefied state	الحالة المُسالة



Importance and uses of nitrogen :

1 Nitrogen is recently used in filling car tires, because nitrogen is characterized by its relative constancy in volume when the temperature changes.



2 Liquefied nitrogen is used in :
a. Treatment of skin tumors.
b. Rapid cooling and preserving food, medicines and vaccines which are spoiled by heat to be transferred easily.



3 Nitrogen is used in making ammonium nitrate and ammonia which are used in manufacturing soil fertilizers.



4 Nitrogen is used to store liquefied explosives such as petroleum and flammable materials. G.R.
Because nitrogen is an inactive element.



5 Nitrogen is used in small amounts to fill some types of lamps.



car tires	إطارات السيارة	skin tumors	أورام الجلد	relative	نسبى	constancy	ثبات
treatment	علاج	flammable materials	مواد مشتعلة	preserving	حفظ	vaccine	لقاح
manufacturing	صناعة	spoiled	تفسد	soil fertilizers	مخصبات التربة	store	تخزين
explosive	مادة متفجرة						


Lesson

6

Nitrogen is used in the manufacturing of :

a. Gunpowder.
b. Electronic devices.
c. Stainless steel (It is a type of iron which doesn't make rust).





Nitrogen is recently used in filling car tires.

Because it keeps the volume of tires constant when the temperature changes.

Try to answer :

* Test yourself 10
* General exercise of the school book on unit 3
* Model exams on unit 3



gunpowder	البارود	electronic devices	أجهزة إلكترونية	stainless steel	حديد صُلب

Remember



- Nitrogen reacts with oxygen during lightning forming nitrogen oxide that reaches soil during raining.
- Nitrogen exists in legumes and in protein substances that build up the body of all living tissues.
- **Nitrogen is prepared from atmospheric air by removing :**
  - Carbon dioxide from air (by using concentrated sodium or potassium hydroxide).
  - Oxygen from air (by using hot copper).
- Nitrogen reacts with a lighted magnesium ribbon producing a white substance that reacts with water producing ammonia gas which has a very pungent smell.
- Nitrogen is called azote which means lifeless as it doesn't help in burning.
- **Nitrogen is used in :**
  - Filling car tires.
  - Filling some types of lamps.
  - Treatment of skin tumors (liquefied nitrogen).
  - Cooling and preserving food, medicine and vaccines (liquefied nitrogen).
  - Manufacture of stainless steel, gunpowder, electronic devices, ammonia and ammonium nitrate (which are used in fertilizers industry).
  - Storing petroleum oil as it is inactive element.

Questions on lesson three

Questions signed by 📖 have been taken from the school book.

1. Choose the correct answer:

1. Nitrogen molecule consists of .... nitrogen atoms.
   a. one b. two c. three d. four
2. Nitrogen represents .... of the Earth's atmosphere.
   a. 87 % b. 21 % c. 0.03 % d. 78 %
3. The scientist who discovered nitrogen gas was .... *(Damietta 2017)*
   a. Anders Celsius b. Joseph Priestley.
   c. Daniel Rutherford. d. Antaine Lavoisier.
4. Nitrogen is considered the main component of ....
   a. carbohydrates. b. fats. c. proteins. d. (a) , (b) and (c).
5. The main source of nitrogen is ....
   a. air. b. water. c. carbon dioxide. d. (a) , (b) and (c).
6. Nitrogen oxide is formed by combination of nitrogen with ....
   a. hydrogen. b. carbon dioxide. c. oxygen. d. (a) , (b) and (c).
7. Nitrogen oxides are formed in the atmosphere during .... which reaches soil with rainwater. *(Kafr El-Sheikh 2016)*
   a. thunder b. heat c. lightning d. wind
8. Carbon dioxide is absorbed by passing air over ....
   a. sodium hydroxide. b. potassium hydroxide.
   c. sodium carbonate. d. (a) or (b).
9. To prepare nitrogen from air, we should remove .... gas from air.
   a. oxygen b. hydrogen c. carbon dioxide d. (a) and (c)
10. Nitrogen gas is collected during preparation by ....
    a. upward displacement of air. b. downward displacement of water.
    c. downward displacement of air. d. upward displacement of water.
11. On putting a lighted magnesium ribbon in a cylinder containing nitrogen gas, then add a little amount of water, ... gas evolves. *(Alex. 2015)*
    a. oxygen b. nitrogen c. ammonia d. hydrogen
12. Nitrogen gas is prepared from atmospheric air by passing it through ....
    a. a solution of concentrated sodium hydroxide, then hot copper.
    b. a solution of diluted hydrochloric acid.
    c. hydrogen peroxide.
    d. a solution of sodium carbonate.

13. On putting a lighted magnesium ribbon in a cylinder containing nitrogen gas, ... is (are) formed.
    a. a white substance
    b. white and black substances
    c. a black substance and a gas with a very pungent smells
    d. a white substance and a gas with a very pungent smell
14. .... is (are) colourless, odorless and tasteless gas(es).
    a. Oxygen b. Nitrogen c. Carbon dioxide d. (a) and (b).
15. The pungent smell that emits when a lighted magnesium ribbon reacts with nitrogen gas is .... *(Sohag 2016)*
    a. oxygen. b. nitrogen. c. ammonia. d. carbon dioxide.
16. Nitrogen is called "azote" which means ....
    a. life gas.
    b. lifeless gas.
    c. water soluble gas.
    d. water insoluble gas.
17. Nitrogen gas doesn't easily react with a lot of elements as it is ....
    a. active element.
    b. inactive element.
    c. active compound.
    d. inactive compound.
18. A gas used to store petroleum and some flammable materials is ....
    a. oxygen. b. nitrogen. c. hydrogen. d. carbon dioxide.
19. A gas used to fill some types of lamps is .... *(Red Sea & Matrouh 2017)*
    a. oxygen. b. nitrogen. c. hydrogen. d. carbon dioxide.
20. Liquid nitrogen is used in ....
    a. treatment of skin tumors.
    b. preserving food products.
    c. preserving atmospheric pressure.
    d. (a) and (b).
21. Nitrogen gas is used in the manufacture of .... *(Sohag & Ismailia 2017)*
    a. fire extinguishers.
    b. soil fertilizers.
    c. soft drinks.
    d. dry ice.
22. .... gas is one of the components of gunpowder. *(Sharkia & El-Behira 2016)*
    a. Oxygen b. Carbon dioxide c. Nitrogen d. Argon
23. .... is a gas used in filling car tires. *(Red Sea 2015)*
    a. Oxygen b. Carbon dioxide c. Nitrogen d. Hydrogen
24. Nitrogen is used in the manufacture of .... *(Suez 2015)*
    a. gunpowder.
    b. electronic devices.
    c. stainless steel.
    d. (a) , (b) and (c).

3 Lesson

25. Soil fertilizers are manufactured from ....
   a. ammonia.
   b. ammonium nitrate.
   c. carbon dioxide.
   d. (a) and (b).

26. The gas which is used in the manufacture of ammonia is ....
   a. nitrogen.
   b. oxygen.
   c. carbon dioxide.
   d. hydrogen.

27. Nitrogen gas is recently used in filling car tires, because ....
   a. it is a colourless gas.
   b. it doesn't burn.
   c. the relative constancy in volume when the temperature changes.
   d. it doesn't react with most elements.

2. Choose from column (B) what suits it in column (A) :

(A)	(B)
1. From the characters of nitrogen gas is	a. It absorbs carbon dioxide gas when preparing nitrogen gas from air
2. Sodium hydroxide solution	b. N_3
3. The substance produced from putting burning magnesium ribbon in nitrogen gas	c. Reacts with water producing ammonia.
4. Nitrogen gas is symbolized by	d. It doesn't help in burning.
	e. It helps in burning.
	f. N_2

1. .... 2. .... 3. .... 4. ....

3. Put (✓) in front of the right statement and (×) in front of the wrong one, then correct it :

1. Nitrogen gas represents 21% of the volume of atmospheric air. ( )
(Cairo 2016)
2. Nitrogen gas is the most abundant gas in air. ( )
3. Nitrogen contributes to the composition of all living tissues. ( )
4. Nitrogen gas is the most important gas as it forms carbohydrate substances. ( )
5. Magnesium oxide reaches soil with rain water. ( )
6. In legumes, the nodular bacteria fix nitrogen of atmospheric air. ( )
(Alex. 2013)
7. Legumes such as clover benefit from the nitrogen in the air. ( )
(Sohag & Aswan 2016)



8. Nitrogen gas is collected by downward displacement of water. ( ) (Matrouh 2014)
9. Sodium hydroxide and potassium hydroxide absorb oxygen from atmospheric air. ( )
10. During preparation of nitrogen in laboratory, hot copper absorbs carbon dioxide gas from the atmospheric air. (Alex. 2012) ( )
11. Nitrogen gas easily dissolves in water. (Aswan 2013) ( )
12. Nitrogen gas helps in combustion process. ( )
13. Nitrogen gas is called azote which means life gas. (Suez 2017) ( )
14. Nitrogen can be condensed to a liquefied state. ( )
15. Nitrogen gas reacts easily with other elements. (Luxor 2017) ( )
16. Oxygen gas is colourless, tasteless, odorless and doesn't help in burning. ( )
17. A lighted magnesium ribbon combines with nitrogen forming a white substance. ( )
18. Ammonia gas has a pungent smell. ( )
19. Car tires are filled with nitrogen to keep its volume constant at different temperatures. (Kafr El-Shiekh 2013) ( )
20. Ozone gas is used in the tanks of liquefied explosives and flammable materials. ( )
21. Some types of lamps are filled with small amounts of carbon dioxide. ( )
22. Liquid nitrogen is used to treat skin tumors. (Ismailia 2014) ( )
23. Nitrogen is used in making ammonia and ammonium nitrate. ( )
24. Liquid nitrogen is used in cooling food products. ( )
25. Nitrogen is used to make stainless steel. (El-Minia 2017) ( )

4. Correct the underlined words :

1. Nitrogen **reacts easily** with other elements. (..............)
2. Legumes such as clover and peas benefit from **oxygen** in the formation of proteins. (Sharkia 2015) (..............)
3. The main source of nitrogen during preparation is **water**. (..............) (Aswan 2011)
4. Nitrogen is also called azote which means **life** gas. (Cairo 2017) (..............)
5. Nitrogen is used as an **active** element to store liquefied explosive and flammable materials. (..............)



6. The nodular bacteria fix **oxygen** in roots of leguminous plants. (..............)
(Port Said & Damietta 2016)
7. Nitrogen molecule consists of **three** nitrogen atoms. (..............)
8. Nitrogen represents **87%** of the atmospheric air volume. (..............)
9. During lightning, nitrogen reacts with oxygen in the air forming **carbon dioxide** that reaches the soil during raining. (..............)
10. When a glowing magnesium ribbon is placed in a jar containing nitrogen gas and adding a little water, **hydrogen** gas emits. *(Menofia 2016)* (..............)
11. **Solid** nitrogen is used to treat the skin tumors. *(Alex. 2014)* (..............)
12. Legumes such as clover and peas form **ammonia** from atmospheric nitrogen.
13. **Carbon dioxide** is used to store explosive materials. (..............)
(Port Said 2011)
14. **Oxygen** contributes to the composition of all living tissues. (..............)
(Port Said 2012)
15. Sodium **carbonate** is used to absorb carbon dioxide from air. (..............)
16. Oxygen is removed from air by passing it over **magnesium**. (..............)
17. Nitrogen gas is **easily** soluble in water. (..............)
18. Ammonia gas has a **fruity** smell. (..............)
19. **Carbon dioxide** gas is used in the manufacture of ammonia which used in the manufacture of soil fertilizers. *(Cairo 2015)* (..............)
20. Small amounts of **oxygen gas** are used to fill some types of lamps.
(Giza 2014) (..............)
21. **Hydrogen** is used in filling car tires. *(Gharbia 2017)* (..............)
22. **Carbon dioxide** gas is used in the manufacture of gunpowder. (..............)
(Red Sea 2013)

5. Write the scientific term of each of the following :

1. The most abundant gas in the atmospheric air. (..............)
2. It forms about 78% of the volume of atmosphere. *(Kafr El-Shiekh 2012)* (..............)
3. A gas that is called azote which means lifeless gas. *(Menofia 2016)* (..............)
4. Chemical substances formed in the atmosphere as a result of combination between oxygen and nitrogen during lightning. (..............)
(Damietta & Beni-Suef 2016)
5. A kind of plants that produce proteins from atmospheric nitrogen by the help of a specific type of bacteria that live in their roots. *(Giza 2016)* (..............)



6. A specific type of bacteria live in roots of the legumes. (..............)
7. The main source of preparing nitrogen gas. *(Sharkia 2017)* (..............)
8. A gas that composes the protein substance that builds up our bodies. *(Kalyoubia & Menofia 2017)* (..............)
9. A chemical substance that absorbs carbon dioxide gas from air. (..............)
10. It is used to absorb oxygen gas from air during preparation of nitrogen in laboratory. (..............)
11. A gas that recently used in filling car tires. *(Alex. 2017)* (..............)
12. It is used in the treatment of skin tumors and cooling food products. (..............)
13. Chemical substances included in the composition of soil fertilizers. (..............)
14. A gas used in the manufacture of ammonia. *(Aswan 2017)* (..............)
15. A gas used in the manufacture of gunpowder and ammonium nitrate that used in making fertilizers. *(Red Sea 2016)* (..............)
16. A gas used in the storage of petroleum and some flammable substances. *(Behiera & Sohag 2017)* (..............)
17. A gas used in making stainless steel, electronic devices and gunpowder. *(Luxor 2017)* (..............)
18. A gas used in small amounts to fill some types of lamps. (..............) *(Cairo 2015)*

6. Complete the following statements :

1. Nitrogen is an element that found in nature in .... state.
2. Nitrogen molecule consists of .... nitrogen atoms and its symbol is ....
3. Nitrogen forms .... % of the volume of the atmosphere and contributes in the composition of living organisms' .... *(South Sinai 2017)*
4. .... is the main component of protein substances. *(Kafr El-Shiekh)*
5. Oxygen reacts with nitrogen during lightning and produces ....
6. Legumes such as .... , ... and soybeans produce .... from the atmospheric nitrogen.
7. Legumes form protein substance with the help of a certain type of .... that live in the ....
8. .... is the scientist who had discovered nitrogen.

3 Lesson

9. Nitrogen is prepared from .... *(El-Menofia 2014)*
10. The removal of carbon dioxide gas from atmospheric air is done by passing air over ....
11. The removal of oxygen from atmospheric air occurs by passing air over ....
12. Nitrogen gas is collected by downward displacement of ....
13. Nitrogen gas does not help in ....
14. When nitrogen reacts with a burning magnesium ribbon, ... is formed which dissolves in water to produce .... gas.
15. Nitrogen gas is called azote, because it .... *(Red Sea 2015)*
16. Nitrogen gas is used to make .... *(Giza 2014)*
17. Nitrogen gas .... dissolves in water.
18. .... gas is used in the manufacture of ammonia. *(Cairo 2011)*
19. .... gas doesn't easily react with a lot of elements.
20. Nitrogen gas is used in filling ....
21. Liquid nitrogen is used in the .... and ....
22. Small amounts of .... are used to fill some types of lamps.
23. .... gas contributes in composing gunpowder. *(Assiut 2017)*
24. .... gas is used to store petroleum and some flammable materials.
25. Nitrogen is used in making .... and .... which are used in the manufacture of soil fertilizers.
26. .... gas is used in the manufacture of stainless steel. *(Red Sea 2012)*
27. .... is used as a treatment of skin tumors. *(Kafr El-Sheikh 2014)*
28. Nitrogen is used in the manufacture of .... which doesn't rust. *(Giza 2017)*

7. Give reasons for the following :

1. Nitrogen contributes in the composition of all living tissues. *(El-Sharkia 2012)*
....
2. Nitrogen is very important for legumes.
....
....
3. Nitrogen is very important in the human's life. *(Sohag 2015)*
....



4. During preparation of nitrogen, air is passed over sodium or potassium hydroxide solution. *(Damietta 2017)*

....

5. During preparation of nitrogen, air is passed over hot copper. *(Alex. 2017)*

....

6. Nitrogen gas is collected by the downward displacement of water. *(Fayoum 2017)*

....

7. A lighted match is put out if it is placed in a cylinder filled with nitrogen.

....

8. A pungent odour is evolved as a result of adding water to the product of burning magnesium in nitrogen. *(Port Said 2017)*

....

9. Nitrogen is called azote which means lifeless. *(Qena 2014)*

....

10. Nitrogen is recently used in filling car tires. *(Menofia & Dakahlia 2017)*

....

11. Liquefied nitrogen is used for cooling food products and medicines.

....

12. The main source to prepare nitrogen is the air. *(Sohag 2014)*

....

13. Nitrogen is used to store petroleum and some flammable materials. *(Gharbia 2017)*

....

14. Nitrogen gas is used to store liquefied explosive materials.

....

8. What happens when ...?

1. Nitrogen gas is not present in the atmospheric air. *(Behiera 2017)*

....

2. Atmospheric air is passed over sodium hydroxide or potassium hydroxide.

....

....

3. Atmospheric air is passed over a tube containing hot copper. *(El-Dakahlia 2011)*

....

3 Lesson

4. A lighted magnesium ribbon is placed in a cylinder filled with nitrogen, then add some drops of water to the produced substance. *(Kalyoubia 2017)*

....

....

5. A banana fruit is immersed quickly in a liquefied nitrogen. *(El-Behira 2014)*

....

6. The percentage of nitrogen gas decreases in nature.

....

7. Oxygen reacts with nitrogen during lightning. *(Dakahlia 2017)*

....

8. Getting rid of soil bacteria. *(Giza 2017)*

....

....

9. Condensation of nitrogen gas. *(Kalyoubia 2017)*

....

9. Explain how can you get ...?

1. Nitrogen gas from the air.

....

....

....

2. Ammonia from nitrogen gas.

....

....

....

10. Mention the properties of nitrogen gas. *(Sohag 2016)*

....

....

....

....

11. Compare between oxygen gas and nitrogen gas (from the point of combustion). *(El-Kalyoubia 2013)*

....

....

....

....

12. Mention one function only of :

1. Soil bacteria. *(Giza 2015)*

....

2. Solution of sodium or potassium hydroxide during preparation of nitrogen from air in laboratory. *(Cairo & Kafr-El-Sheikh 2016)*

....

3. Hot copper in preparing nitrogen gas. *(Dakahlia & New Valley 2017)*

....

4. Liquid nitrogen. *(Damietta 2015)*

....

13. Mention the importance of nitrogen gas in :

a. Nature.

....

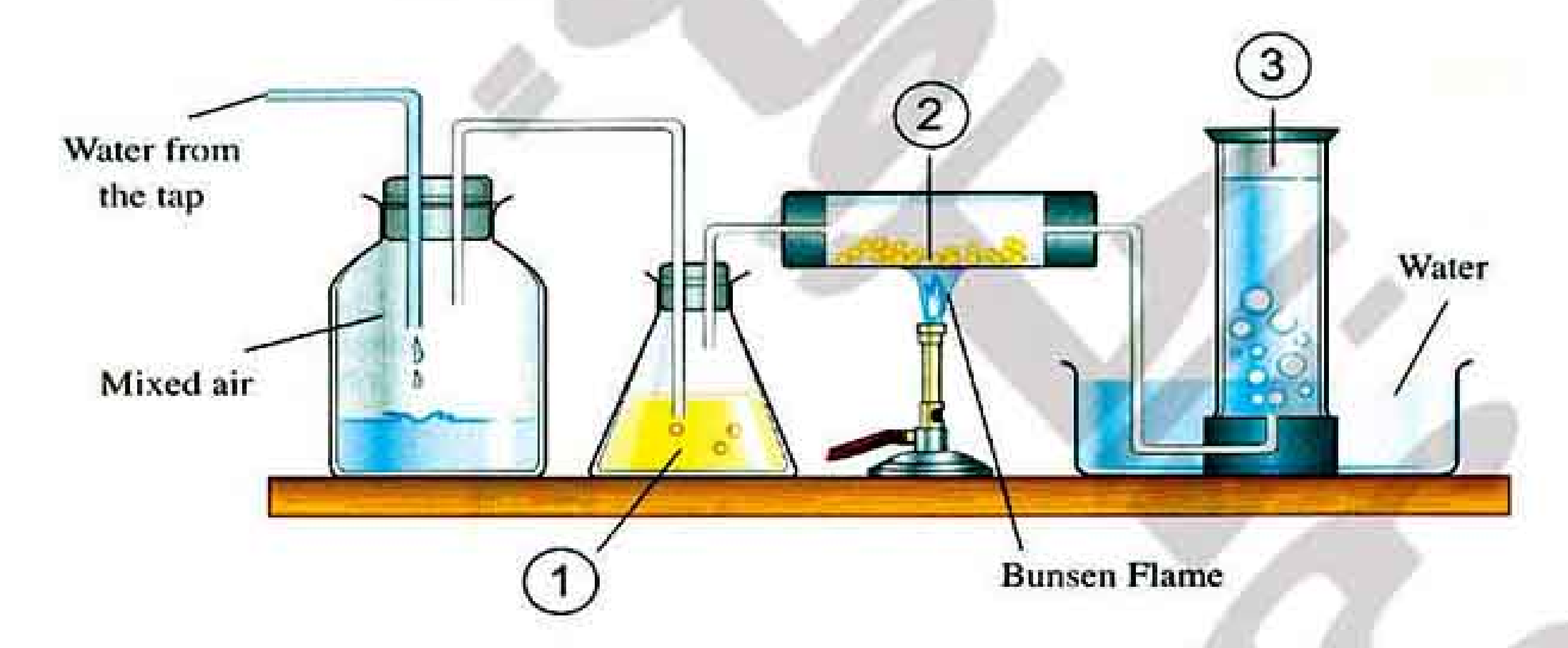
....

b. Industry. *(Alex. 2016)*

....

....

14. Look at the following figure, then answer :



a. Label the figure.

b. This apparatus is used for the preparation of ....

c. Explain why atmospheric air is passed over label no. (1).

....

d. Explain why atmospheric air is passed over label no. (2).

....

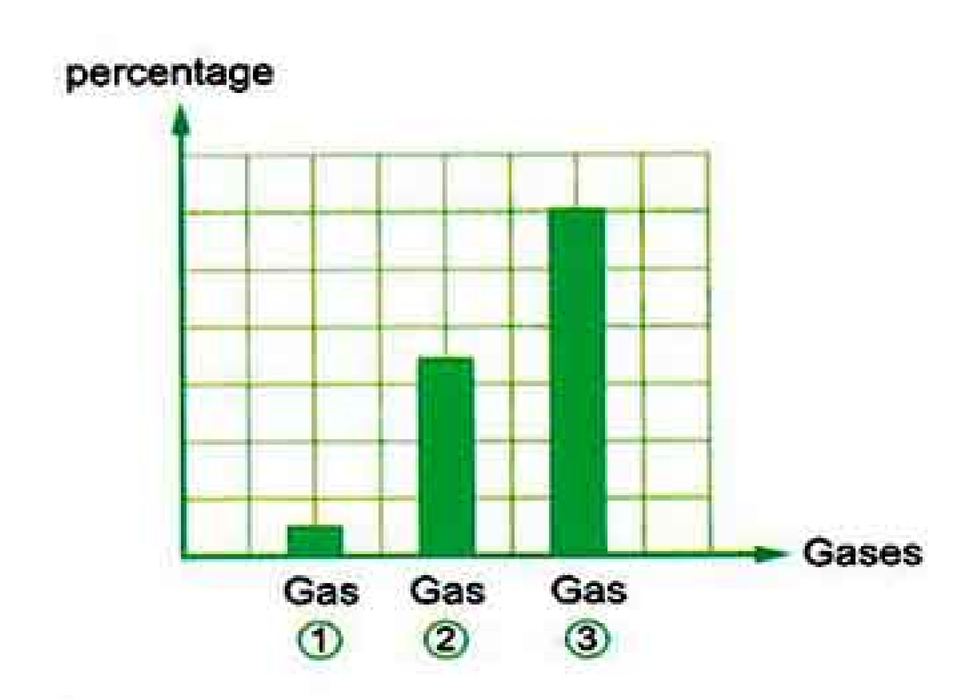
e. Label no. (3) is collected in the cylinder by .... displacement of water, because ....

Timss Questions



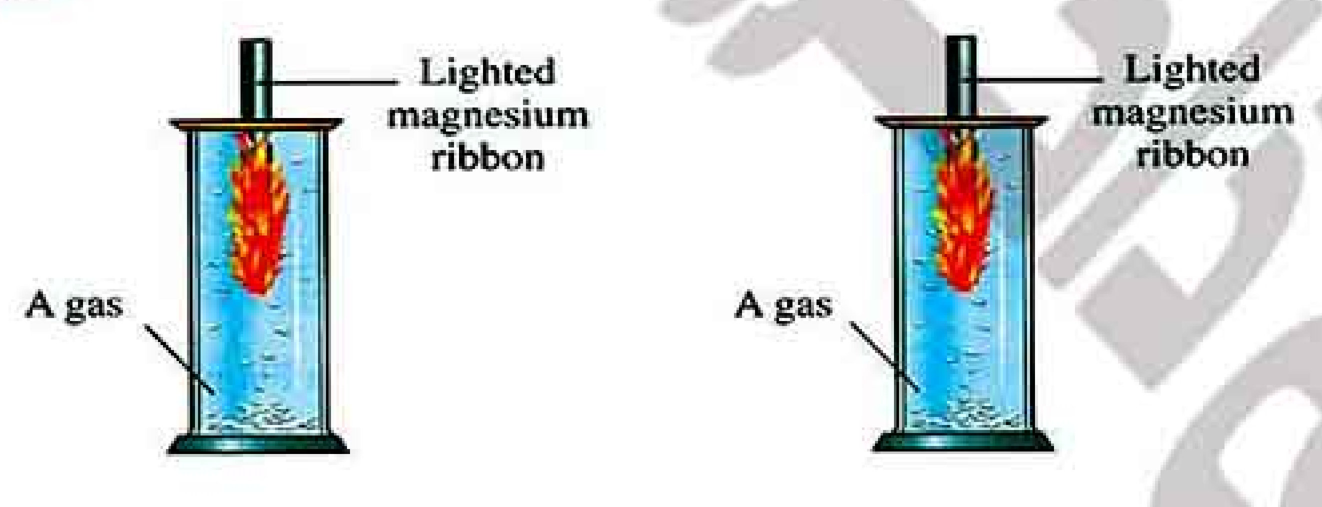
1. The opposite diagram shows the percentages of oxygen, nitrogen and carbon dioxide in the atmospheric air.

1. Oxygen is represented by gas number ....
2. Carbon dioxide is represented by gas number ....
3. Nitrogen gas is represented by gas number ....
4. Gas number (3) is called .... which means lifeless gas.



5. Dil. hydrochloric acid + calcium carbonate $\xrightarrow{\text{produces}}$ Gas number ....

2. In the previous figures, you insert a lighted magnesium ribbon in two cylinders, one of them is filled with oxygen, while the other cylinder is filled with nitrogen.



1. What happens to the magnesium ribbon in each cylinder ?
....
....
....

2. How can you know which cylinder contains nitrogen ?
....
....



3. The following table shows some properties of some gases. Read them carefully then choose the correct answer.

Gas Ⓐ	Gas Ⓑ	Gas Ⓒ
1. It scarcely dissolves in water. 2. It doesn't easily react with a lot of element 3. It is a lifeless gas	1. It easily dissolves in water. 2. It is heavier than air. 3. It doesn't burn and doesn't help in burning.	1. It scarcely dissolves in water. 2. It is heavier than air. 3. It doesn't burn but it helps in burning.

a. Gas Ⓐ is oxygen, gas Ⓑ is nitrogen and gas Ⓒ is carbon dioxide.

b. Gas Ⓐ is carbon dioxide, gas Ⓑ is nitrogen and gas Ⓒ is oxygen.

c. Gas Ⓐ is nitrogen, gas Ⓑ is carbon dioxide and gas Ⓒ is oxygen.

d. Gas Ⓐ is nitrogen, gas Ⓑ is oxygen and gas Ⓒ is carbon dioxide.





UNIT FOUR

Structure and Function

Lessons of the unit :

1. **Human nervous system.**
2. **Human locomotory system.**

Unit Objectives : By the end of this unit, you will be able to :

- Identify the structure and functions of the human nervous system.
- Explain the occurrence of reflex action.
- Identify the importance of the human nervous system and ways of maintaining it.
- Identify the structure of the human muscular system.
- Explain the importance of muscles and joints for movement.
- Identify some ways to maintain the locomotory system.



Lesson 1

Human nervous system

Nervous system is considered the system that controls all the other systems inside your body.

Simply, the nervous system consists of the brain, the spinal cord and the nerves.

Nervous system

It is a communication and controlling body system.

It is the most important system inside your body, because :

1. It controls and regulates all the vital operations of the body as it receives information from the environment and from the body, then it interprets this information and makes the body respond to it.
2. It is responsible for knowing if things are :

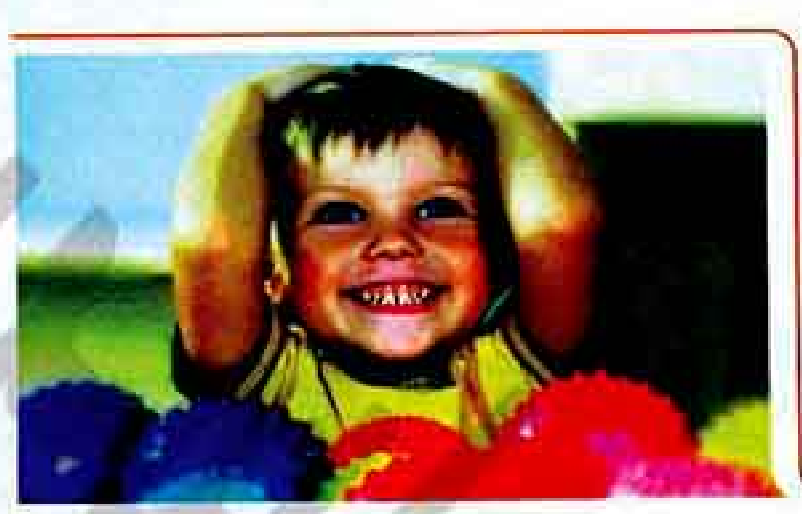

Hot or cold

Sweet or bitter


Rough or smooth

nervous system	الجهاز العصبى	communication	الإتصال	regulate	يُنظِم
vital operations	عمليات حيوية	interpret	يُفسر	respond	يستجيب
bitter	مُرًا	rough	خشن	smooth	ناعم

3. It adjusts the responses that require emotions, so it makes you :



Sad or happy



Angry or calm

4. It oversees and regulates the multiple functions performed by the human body such as moving , feeding , digestion , breathing, thinking.

- **The building unit of the nervous system is the nerve cell that is called "neuron".**



Neuron (Nerve cell)

Neuron

It is the building unit (basic structure) of the nervous system.

Exercise

Write the scientific term :

1. The basic structural unit of the nervous system (..................)

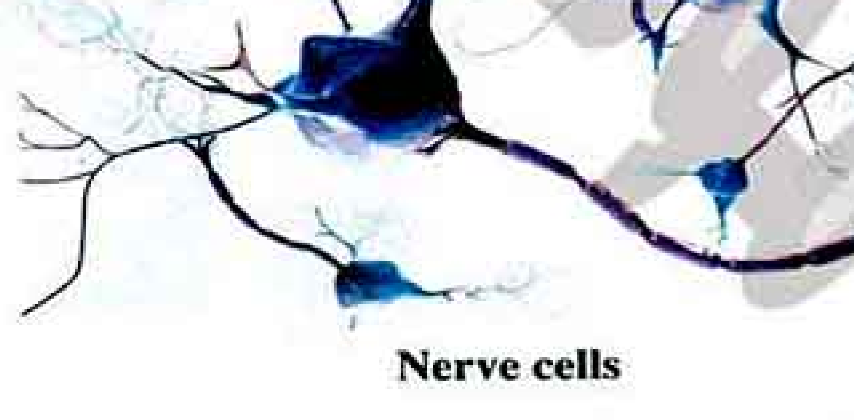
2. The system that controls and regulates all the vital operations of your body. (..................)

When you examine a slide of a neuron by a microscope, you observe that :

The neuron (nerve cell) consists of two main parts which are :

1. The cell body.

2. The axon.



Nerve cells

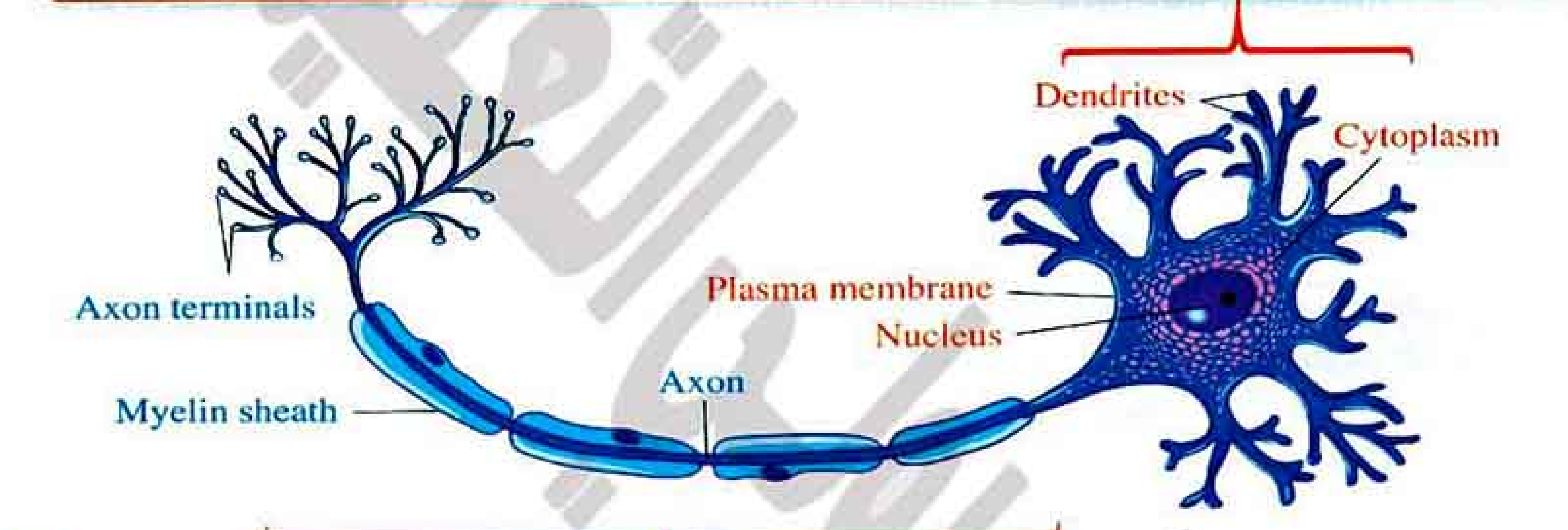
adjust	يضبط	emotions	مشاعر	oversees	يُشرف
multiple functions	الوظائف المتعددة	nerve cell	الخلية العصبية	building unit	وحدة بناء
axon	محور الخلية			cell body	جسم الخلية

1 The cell body :

- It contains a nucleus, cytoplasm and plasma membrane.
- There are some branches extending from the neuron's cell body called dendrites.

Function of dendrites :

They are connected to the neighbouring neurons to form the synapse (synaptic areas).



2 The axon :

- It is a cylindrical axis covered with a fatty layer called myelin sheath.
- The axon ends in nerve endings called axon terminals.

Function of axon terminals :

They are connected to the muscles or form a synapse with other neurons.

Exercise

Complete the following sentences :

1. *The neuron consists of .... and ....*
2. *.......... is the building unit of the nervous system.*
3. *.......... are branches that extend from the neuron's body and are connected to the neighbouring neurons.*
4. *.......... is a cylindrical axis that covered with a fatty layer called ....*

plasma membrane	الغشاء البلازمى	neighbouring neurons	الخلايا العصبية المجاورة	myelin sheath	غلاف ميلينى
branches	تفرعات	dendrites	تفرعات شُجيرية	synaptic areas	مناطق التشابك العصبى
axon terminals	نهايات محورية	synapse	تشابك عصبى		



Lesson 1

Structure of the nervous system

The nervous system consists of two major systems, which are :

First : The central nervous system. **Second :** The peripheral nervous system.

The nervous system

consists of

- **The central nervous system** consists of
  - The brain
  - The spinal cord
- **The peripheral nervous system** consists of
  - Cranial nerves
  - Spinal nerves

Central and peripheral nervous systems

cranial nerves	أعصاب مُخية	spinal nerves	أعصاب شوكية
spinal cord	الحبل الشوكى	central nervous system	الجهاز العصبى المركزى
peripheral nervous system	الجهاز العصبى الطرفى	brain	المخ



First The central nervous system

It is composed of :

1. The brain. **2.** The spinal cord.

1 The brain :

The brain

It is a nerve block containing millions of nerve cells (neurons) and it is the main control center in your body.

Its location :

The brain is located inside a bony box called skull to protect it.

skull Brain

Its function :

It directs and coordinates all the processes, ideas, behaviours and emotions.



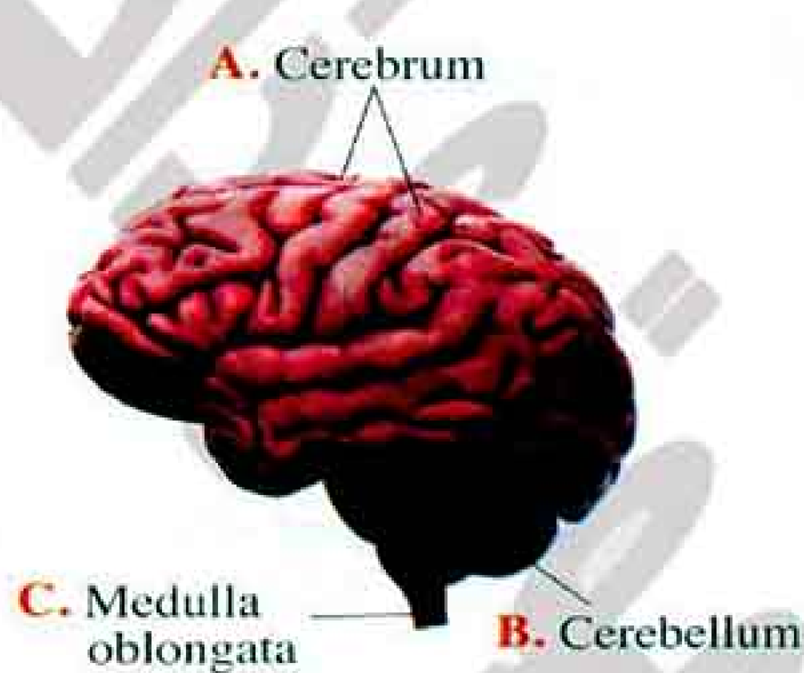
Its structure :

The brain of the human or some animals like sheep consists of three main parts which are :

A. Cerebrum (two cerebral hemispheres).

B. Cerebellum.

C. Medulla oblongata.



G.R.

The brain is the main control center in the human body.

Because it directs and coordinates all the processes, ideas, behaviours and emotions.

nerve block	كتلة عصبية	main control center	مركز التحكُم الرئيسى	bony box	علبة عظمية
skull	الجُمجمة	coordinate	يُنسق	cerebral hemispheres	النصفان الكرويان
cerebellum	المُخيخ	medulla oblongata	النخاع المستطيل		

1 Lesson



Activity 1 To examine the structure of the sheep's brain.

Materials:

Fresh sheep's brain-dissecting tools (forceps - dissecting needle - scalpel)

c. Medulla oblongata
b. Cerebellum
a. Cerebrum

Sheep's brain (longitudinal section)

Steps:

1. Examine the sheep's brain and identify its main parts.

Observation:

The sheep's brain consists of :

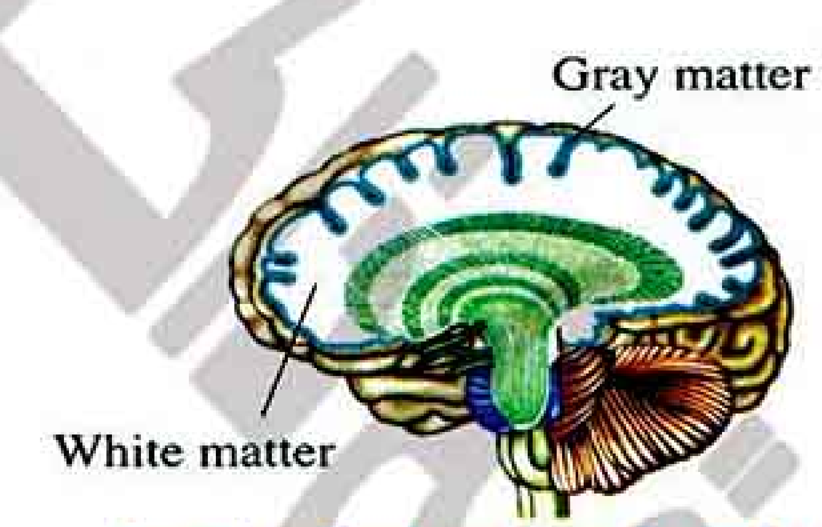
a. Cerebrum.
b. Cerebellum.
c. Medulla oblongata.

2. Make a longitudinal section through the hemispheres using the scalpel.
3. Notice the difference in the colour inside and outside the brain.



Observation:

The outer part of the two hemispheres is a gray matter, while the inner part is a white matter.



Longitudinal section of cerebrum

Conclusions:

1. The structure of sheep's brain is similar to the structure of the human's brain.
2. The outer part of the two hemispheres (cerebrum) is the gray matter, but the inner part is the white matter.

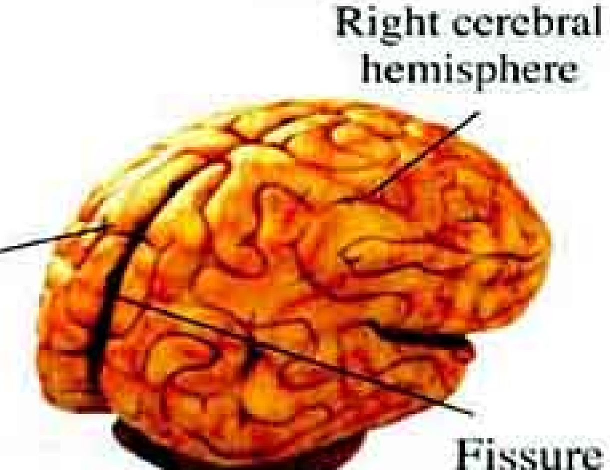
dissecting tools	أدوات تشريح	scalpel	مشرط
longitudinal section	قطاع طولى	forceps	ملقاط

Now, we will study the components of the human's brain.

A Cerebrum (the two cerebral hemispheres) :



- It is the largest part of the brain.

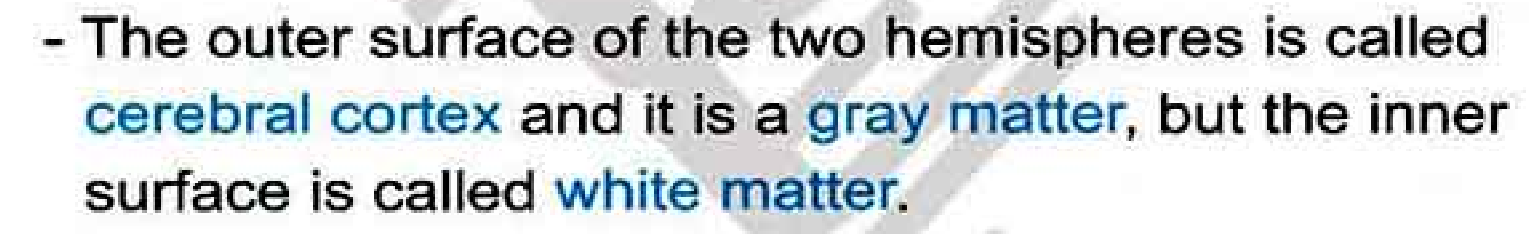


Brain

- It is divided into two halves (right and left cerebral hemispheres) by a fissure and attached to each other through nerve fibres.



- The outer surface of the two hemispheres is called cerebral cortex and it is a gray matter, but the inner surface is called white matter.



- The two hemispheres have many convolutions and folds on their surface.

Their functions :

1. They control the voluntary movements of the body such as walking, sitting and running in races.



Cerebrum is a very important part in the brain.

2. They receive nerve impulses from five sense organs (eyes, ears, nose, tongue and skin) and send the suitable responses to these impulses.
3. They contain the centers of thinking and memory (concentration).

B Cerebellum :





Its location :

- It lies at the back area of the brain below the two cerebral hemispheres.

Cerebellum

Its function :

It maintains the balance of the body during the movement.

cerebral cortex	القشرة المُخية	convolutions	تلافيف	folds	ثنيات
voluntary movements	حركات إرادية	races	السباقات	sense organs	أعضاء الحس
centers of thinking	مراكز التفكير	memory	الذاكرة	maintain	تُحافظ
fissure	إنفلاق/شَق	concentration	التركيز		



1
Lesson

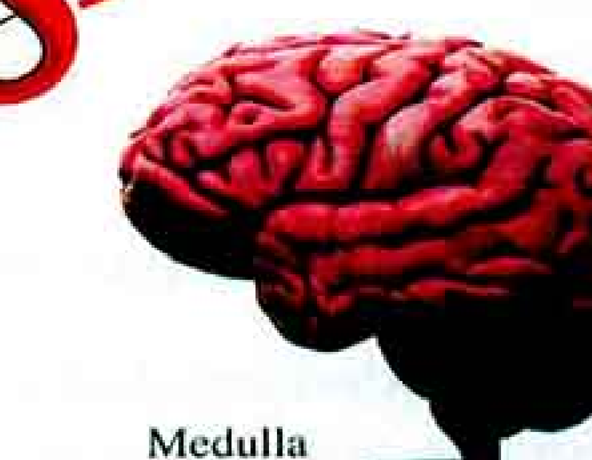
C Medulla oblongata :





Its location :

- It lies in front of the cerebellum.
- It connects the brain with the spinal cord.

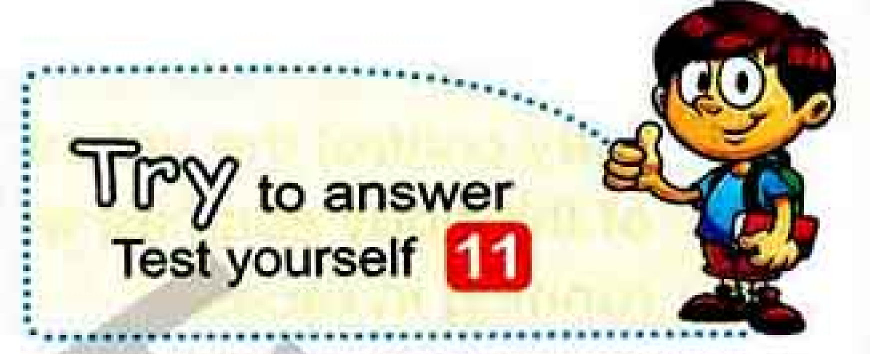
Its functions :

- It is responsible for regulating the involuntary processes of the body as :
  1. Regulating heartbeats.
  2. Regulating the movement of the respiratory system parts during breathing.
  3. Regulating the movements and functions of the digestive system.

G.R.
Damage of medulla oblongata causes death.

Do you know ?

- In the adult human, brain weighs about 1.5 kg.
- Some people believe that if the human brain gets bigger, the intelligence will increase, but this is not true,where all adults have an equal brain sizes.



2 The spinal cord :

It is a cylindrical cord from which the spinal nerves extend.

Gray matter
White matter
Spinal cord
Spinal nerve
Vertebra

Its location :

It extends in a channel within a series of vertebrae in the backbone (the vertebral column) for protection.

Its structure :

It consists of :

- Internal gray matter that has the shape of letter "H".
- External white matter.

involuntary	لا إرادية	heartbeats	نبضات القلب	vertebral column	العمود الفقرى
intelligence	الذكاء	vertebrae	فقرات		



Its functions :

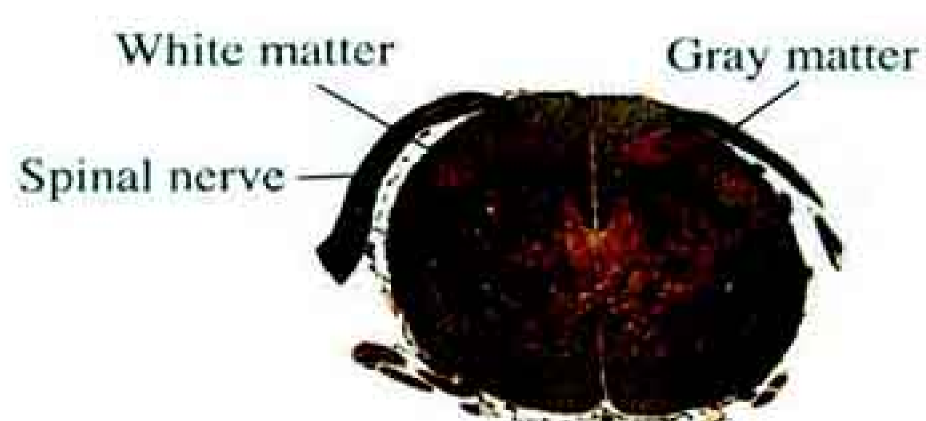
- It delivers the nerve messages from the body organs to the brain and vice versa.
- It is responsible for the reflexes (a group of reflex action) such as the withdrawal of the hand quickly when touching a hot surface.



Activity 2 To examine a cross-section of the spinal cord.

Step:

Examine a slide of cross-section of the spinal cord by a microscope.



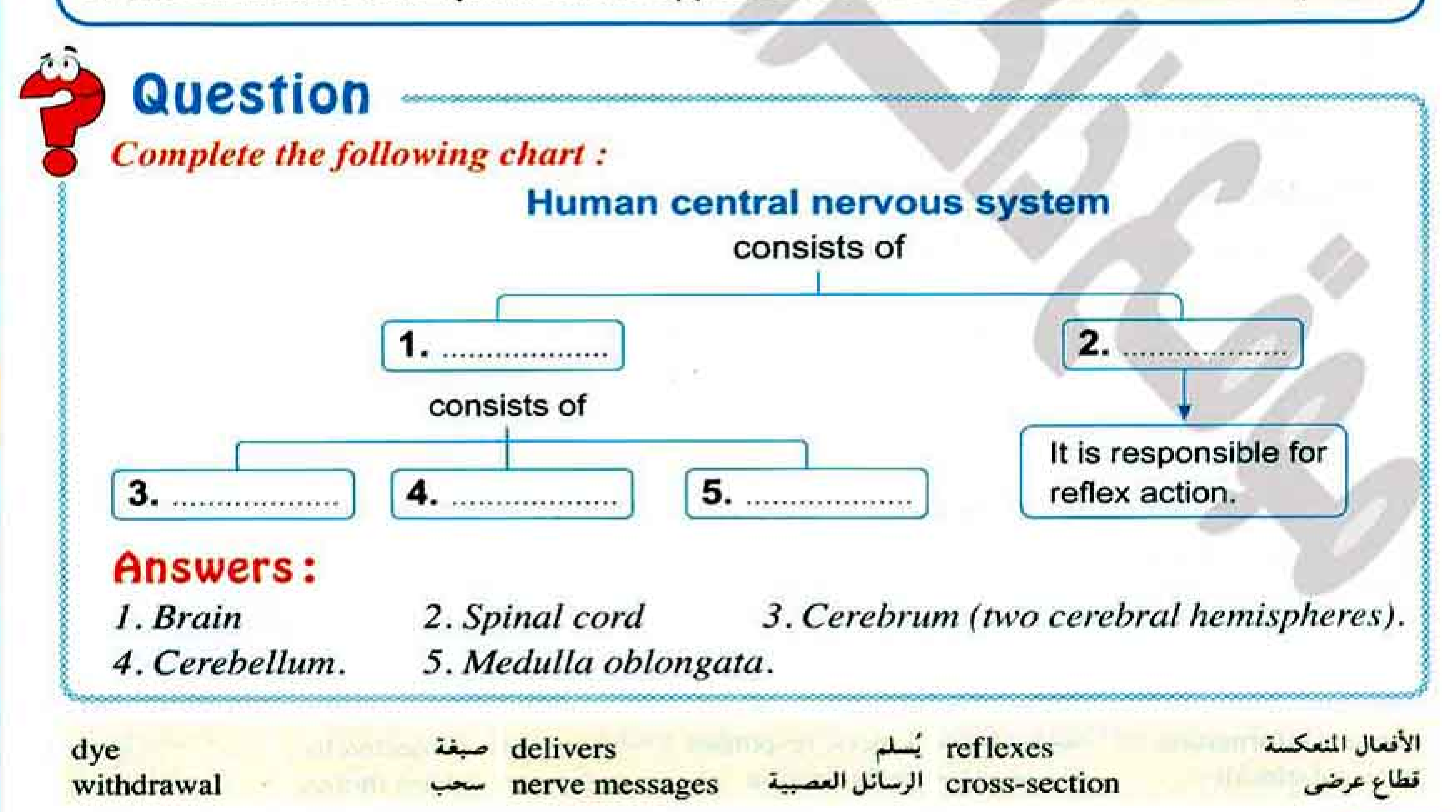
Cross-section of spinal cord (a sample with dye under microscope)

Observation:

There is an internal gray matter that has the shape of letter "H" and surrounded by an external white matter.

Conclusions:

1. The internal part of the spinal cord is the gray matter, but the external part is the white matter.
2. The structure of the spinal cord is opposite to that of the two cerebral hemispheres.



Question

Complete the following chart :

Human central nervous system

consists of

1. ....
2. ....

(1) consists of

3. ....
4. ....
5. ....

(2) It is responsible for reflex action.

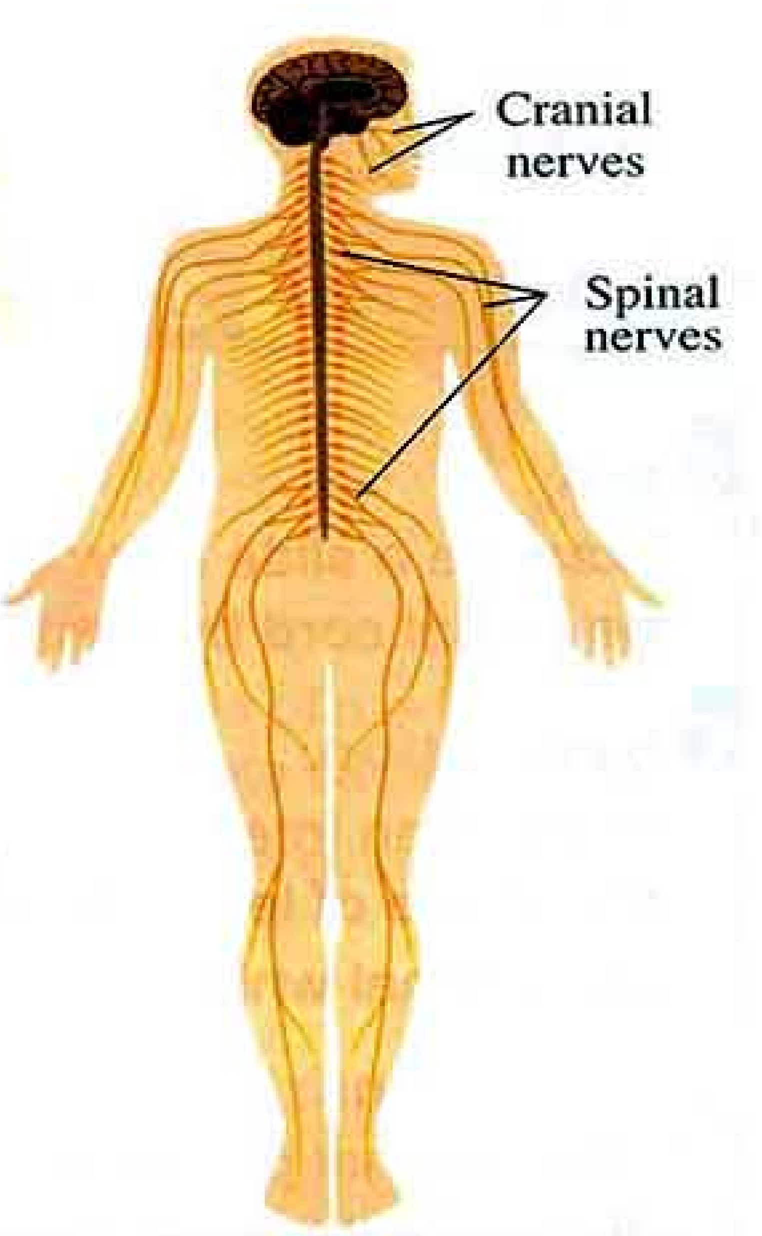
Answers:

1. Brain *2. Spinal cord* *3. Cerebrum (two cerebral hemispheres).*
4. Cerebellum. *5. Medulla oblongata.*

dye	صبغة	delivers	يُسلم	reflexes	الأفعال المنعكسة
withdrawal	سحب	nerve messages	الرسائل العصبية	cross-section	قطاع عرضى



Second The peripheral nervous system



The peripheral nervous system

The peripheral nervous system

It is the nerves which emerge from the central nervous system (the brain and the spinal cord).

It consists of :

- **Cranial nerves** that are 12 pairs of nerves emerge from the brain.
- **Spinal nerves** that are 31 pairs of nerves emerge from the spinal cord.

Its function :

It delivers the sensory information and the kinetic responses between the central nervous system and all parts of the body.

Now, let's study what is meant by reflex action and how does it occur.

The reflex action :

When your body is subjected to external stimuli such as strong light, heat or smell .... etc., your body makes an involuntary response that is called "reflex action."

Reflex action

It is the automatic (spontaneous) response of the body to different stimuli.

* The responsible organ for reflexes is the **spinal cord**.

Examples of reflex action:

1. Moving your hand away quickly when you touch a plant with sharp thorns or touching a hot surface.



sensory information	معلومات حسية	kinetic responses	إستجابات حركية	subjected to	معرضة ل
external stimuli	مؤثرات خارجية	reflex action	فعل منعكس	sharp thorns	أشواك حادة

2 Blinking when something gets close to the eye.



3 Decreasing the size of the eye pupil on intense light and increasing its size on dim light.



4 Making a slight kick when hitting the knee with a solid object.



5 Trying balance during sliding down.



6 Secreting saliva on seeing or smelling good food.

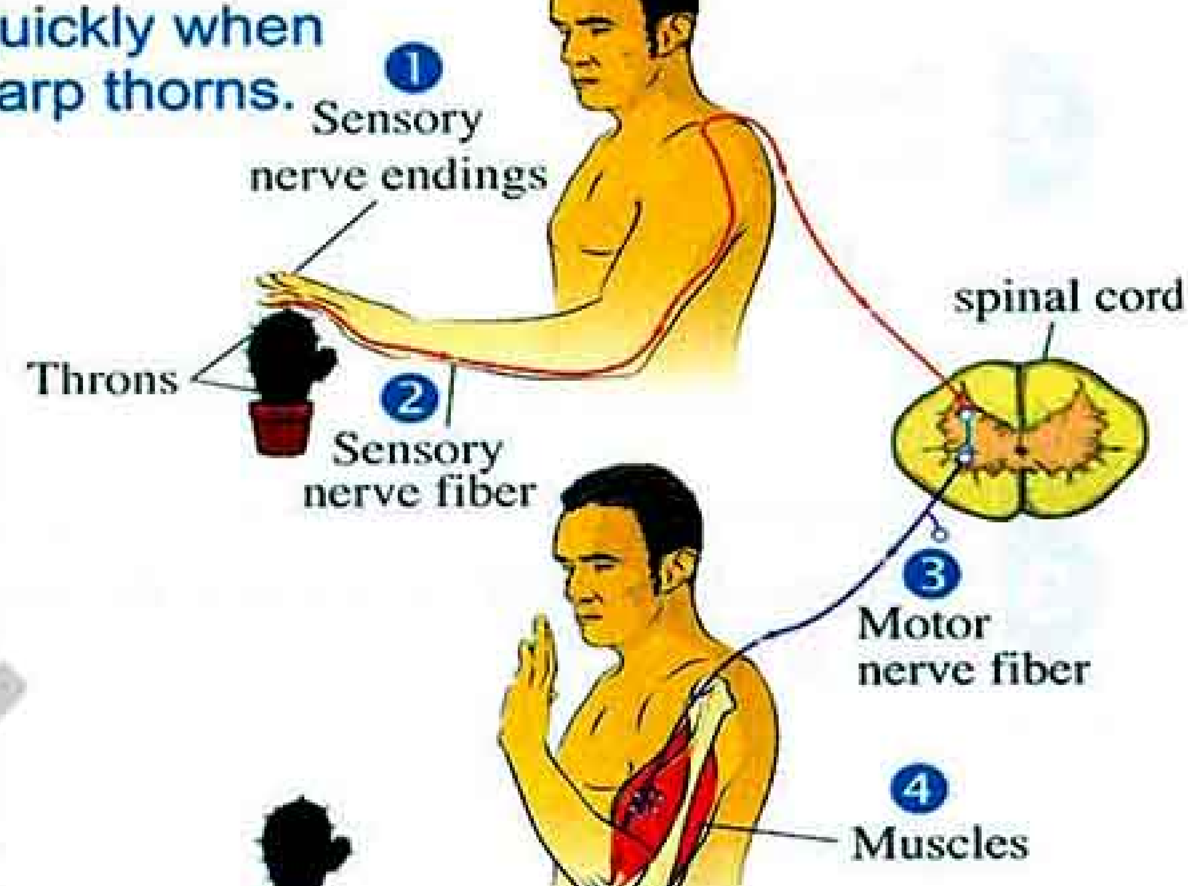


blinking	غمض العين	intense light	الضوء الشديد	secreting saliva	إفراز اللعاب
eye pupil	إنسان العين	dim light	الضوء الخافت	knee	الركبة
slight kick	ركلة قدم خفيفة	sliding down	الإنزلاق	get close	يقترب من
balance	الاتزان	hitting	يضرب		

1
Lesson

How does the reflex action occur ?

Example: Withdrawing your hand quickly when you touch a plant with sharp thorns.



Stages of reflex action are :

1. The thorns of the plant affect the nerve endings in the fingers producing nerve impulses.

2. The nerve impulses are transmitted to the spinal cord through a sensory nerve fiber.

3. Some of nerve impulses produced by the spinal cord are transmitted through a motor nerve fiber to the arm muscles (without the brain's intervention).

4. So, muscles contract and the arm is withdrew away from the thorns.

5. The other nerve impulses produced by the spinal cord are transmitted to the sensory centers in the brain which lead to the true sense of pain.

Generally, from all the previous explanation, we can conclude the importance of the human nervous system as follows :

The importance of the human nervous system :

1. It carryies nerve messages (impulses) from one area of the body to another.
2. It regulates and coordinates all the vital processes within the body.
3. It receives the external stimuli that surround the human being through the sensory organs, then identifies and interprets them.

motor nerve fiber	الليفة العصبية الحركية	nerve endings	النهايات العصبية	sensory nerve fiber	الليفة العصبية الحسية
nerve impulses	نبضات عصبية	sensory centers	مراكز الحِس	intervention	تدخُل

Ways of maintaining the human nervous system

1. Reducing the intake (drinking) of the stimulating substances such as tea, coffee and others because they :
   a. affect sleeping periods.
   b. affect heartbeats.
   c. lead to nervous tension.



2. Staying away from tranquilizers and stimulants.



3. Keeping away from sitting for a long period in front of computer and television to avoid the exhausting of sense organs.



4. Avoiding the extreme exciting situations.



5. Staying away from the sources of pollution (as noisy places and smoke), because they passively affect the nervous system.



intake	تناول	nervous tension	توّتر عصبى	tranquilizers	الحبوب المُهدئة
stimulants	الحبوب المُنشِطة	exhausting	إرهاق	extreme	شديد
exciting situations	مواقف الإنفعال	passively affect	تؤثر سلبيًا على		

6 Staying away from addiction, because it passively affects the nervous system as :
a. Retardation of memory and learning.
b. Nervous tension.
c. Sluggishness.
d. Loss time sensation.
e. Sleepless.



7 Doing physical exercises.

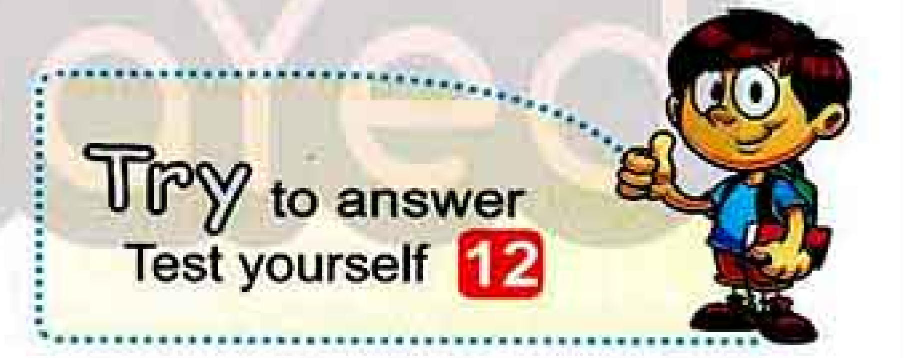


8 Giving the body a sufficient period of rest especially during sleep.



G.R.
- You must reduce the intake of the stimulating substances as tea and coffee
- Avoiding extreme exciting situations.

To keep the nervous system healthy.

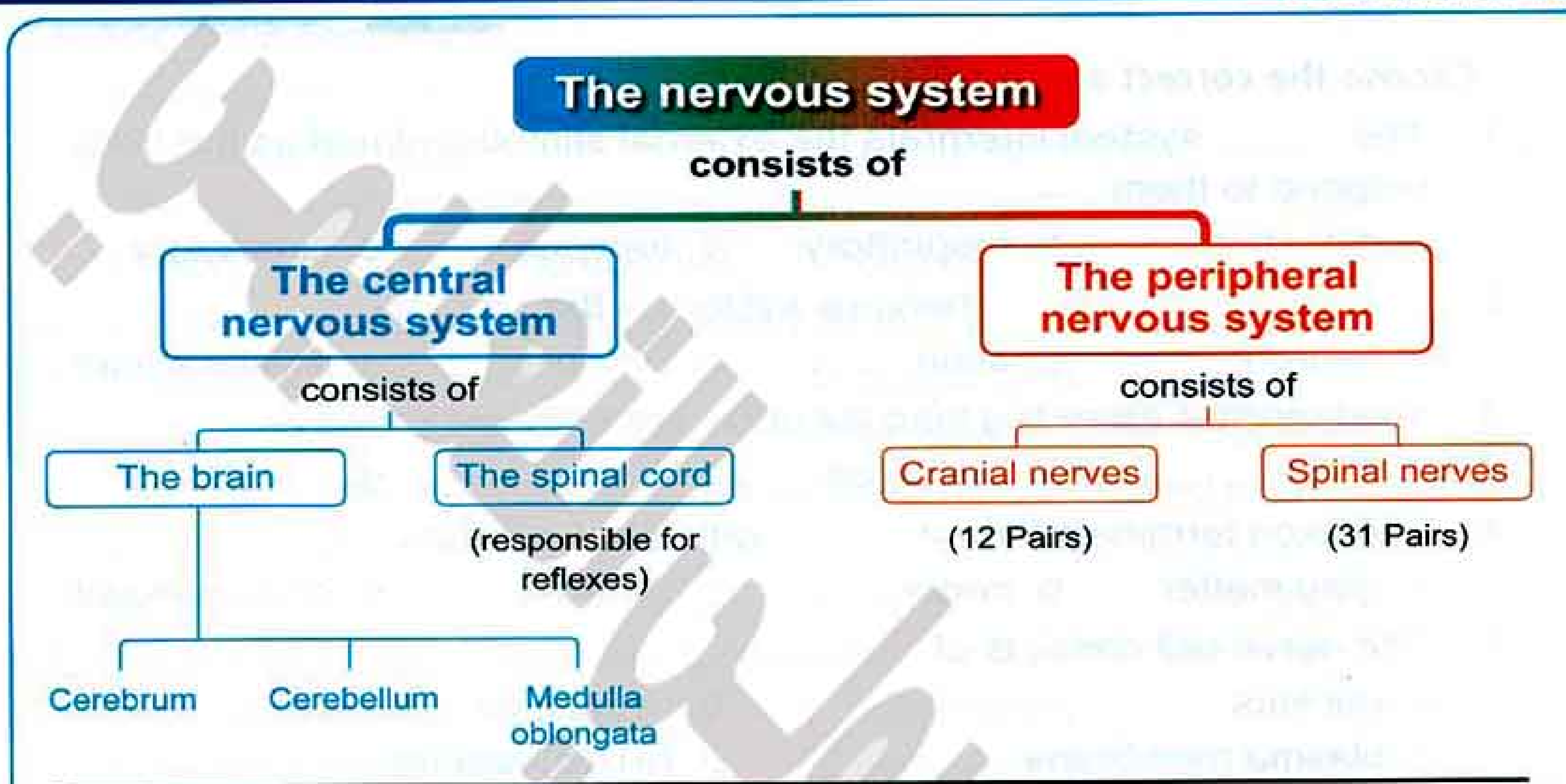


Try to answer Test yourself 12

addiction	الإدمان	retardation	تأخُر	loss time sensation	فقدان الاحساس بالوقت
sluggishness	الكسل	sleepless	الأرق		
sufficient	كافى				

Remember





Comparison between central nervous system and peripheral nervous system :

Points of comparison	Central nervous system	Peripheral nervous system
Structure :	It consists of the brain and the spinal cord.	It consists of 12 pairs of cranial nerves and 31 pairs of spinal nerves.
Function :	- It directs and coordinates all the processes, ideas, behaviours and emotions. - It delivers the nerve messages from the body organs to the brain and vice versa. - It is responsible for the reflexes.	It delivers the sensory information and the kinetic responses between the central nervous system and all parts of the body.



Questions on lesson one

Questions signed by 📖 have been taken from the school book.

1. Choose the correct answer :

1. The .... system interprets the external stimuli and makes the body respond to them.
   a. digestive b. respiratory c. nervous d. circulatory
2. The building unit of the nervous system is the ....
   a. neuron. b. axon. c. synapse. d. myelin sheath.
3. The branches extending from the nerve cell body are known as ....
   a. axons. b. synapses. c. dendrites. d. neurons.
4. The axon terminals form a .... with other neurons.
   a. gray matter b. nerve c. synapse d. myelin sheath
5. The nerve cell consists of .... *(Assiut 2017)*
   a. nucleus b. cytoplasm
   c. plasma membrane. d. (a), (b) and (c)
6. The axon is covered with a fatty substance called ....
   a. gray matter. b. synapse. c. myelin sheath. d. dendrites.
7. 📖 One of the components of the nerve cell body is the ....
   a. blood vessels. b. myelin sheath.
   c. dendrites. d. synapse. *(Port Said & Matrouh 2016)*
8. 📖 Myelin sheath surrounds the .... *(Behiera 2017)*
   a. nerve cell's axon. b. cerebellum.
   c. spinal cord. d. cerebrum.
9. The central nervous system consists of .... *(Suez & El-Behira 2016)*
   a. brain. b. spinal cord. c. skull. d. (a) and (b)
10. All the following are from the components of central nervous system, except, ... *(Damietta & Aswan 2017)*
    a. spinal nerve. b. two cerebral hemisphere.
    c. spinal cord. d. cerebellum.
11. All the following are from the components of the brain except ....
    a. cerebrum. b. medulla oblongata.
    c. spinal nerves. d. cerebellum. *(Red Sea & Sohag 2013)*

12. The .... is responsible for the protection of the brain.
    a. vertebral column b. skull
    c. ribcage d. stomach
13. The brain consists of ....
    a. cerebrum. b. cerebellum.
    c. medulla oblongata. d. (a), (b) and (c).
14. The .... is the largest part of the brain.
    a. skull b. cerebellum c. cerebrum d. spinal cord
15. The centers of thinking and memory lie in .... *(Alex. 2017)*
    a. medulla oblongata. b. spinal cord.
    c. cerebellum. d. two cerebral hemispheres.
16. The outer surface of the two cerebral hemispheres is called cerebral cortex and its colour is .... *(Ismailia 2016)*
    a. red. b. orange. c. black. d. gray.
17. The five sensation centers are located in .... *(Giza 2014)*
    a. two cerebral hemispheres. b. cerebellum.
    c. medulla oblongata. d. spinal cord.
18. Which of the following is responsible for keeping the body balance ? .... *(Suez & Fayoum 2017)*
    a. Medulla oblongata b. Cerebrum
    c. Spinal cord d. Cerebellum
19. .... connects the brain with the spinal cord.
    a. Cerebellum b. Cerebrum
    c. Medulla oblongata d. Axon
20. The cerebellum is responsible for .... *(Matrouh 2016)*
    a. thinking. b. the body balance.
    c. the reflex action. d. memory.
21. The medulla oblongata is responsible for ....
    a. regulating the heartbeats. b. the reflex actions.
    c. the body balance. d. thinking.
22. Regulating the movements and functions of the digestive system is from the functions of the ....
    a. medulla oblongata. b. cerebrum.
    c. cerebellum. d. spinal cord.

23. Controlling the voluntary movements of the body is one of the functions of ....
    a. the brain. b. cerebellum.
    c. nerves. d. cerebral hemispheres.
24. The spinal cord is located within a channel inside the ....
    a. skull. b. vertebral column.
    c. ribcage. d. no correct answer.
25. The part which is responsible for the transfer of nerve messages from different body parts to the brain and vice versa is ....
    a. cerebellum. b. vertebral column
    c. medulla oblongata d. spinal cord.
26. From the functions of the cerebellum is .... *(Aswan 2014)*
    a. regulating heartbeats.
    b. regulating the function of the digestive system.
    c. maintaining the balance of the body.
    d. regulating the movement of respiratory system.
27. .... controls the reflex actions. *(Dakahlia 2017)*
    a. Spinal cord b. Cerebellum c. Cerebrum d. Brain
28. The gray matter in the spinal cord appears in the shape of letter ....
    a. H b. Y c. F d. A *(El-Fayoum 2016)*
29. The position of the gray and the white matter in the spinal cord is .... to that in the hemispheres.
    a. similar b. opposite c. perpendicular d. vertical
30. The organ that regulates the movement of the respiratory system is the ....
    a. cerebrum. b. cerebellum. c. medulla oblongata. d. spinal cord.
31. .... consists of 43 pairs of nerves. *(Dakahlia 2015)*
    a. Cerebrum b. Peripheral nervous system
    c. Central nervous system d. The spinal cord
32. The number of cranial nerves is .... pairs of nerves. *(Sohag 2016)*
    a. 31 b. 21 c. 12 d. 43
33. There are .... pairs of spinal nerves. *(New Valley 2017)*
    a. 31 b. 12 c. 43 d. 32



34. The automatic response of the body to different stimuli is known as the ....
   a. axon.   b. dendrites.   c. reflex action.   d. myelin sheath.
35. All the following are examples for the reflex action except ....
   a. withdrawing hand on touching a hot surface.
   b. secreting saliva on seeing or smelling good food.
   c. breathing.
   d. trying balance during sliding down.
36. The organ that is responsible for blinking when something gets close to the eye is called ....
   a. spinal cord.   b. cerebellum.   c. axon.   d. neuron.
37. All the following are ways to maintain the health of the nervous system except ....
   a. avoiding exciting situations.   b. staying away from pollution.
   c. doing physical exercises.   d. smoking cigarettes.
38. Addiction causes .... *(Gharbia 2017)*
   a. nervous tension.   b. sleepless.
   c. sluggishness.   d. (a) , (b) and (c)

2. Join from column (A) what is suitable from column (B). *(South Sinai 2017)*

(A)	(B)
1. Cranial nerves.	a. responsible for involuntary processes.
2. Spinal nerves.	b. responsible for voluntary processes.
3. Medulla oblongata.	c. responsible for reflex actions.
4. Spinal cord.	d. are 31 pairs of nerves.
5. Cerebellum.	e. are 12 pairs of nerves.
6. The brain.	f. is found inside a bony case called skull.
7. The two cerebral hemispheres.	g. keep the balance of the human body during movement.
	h. is the building unit of nervous system.

1. ....   2. ....   3. ....   4. ....
5. ....   6. ....   7. ....





1 Lesson

3. Put (✓) or (×) in front of the following statements , then correct the underlined words in the wrong ones :

1. The human digestive system is a communicating and controlling body system. ( )
2. The plant cell is called neuron. ( )
3. The nerve cell consists of cell body and blood vessels. *(Giza 2014)* ( )
4. The branches extend from the neuron's cell body are called axons. ( )
5. The synapse is formed as a result of connection of nerve cells' axons. ( )
6. The axon of the nerve cell is surrounded by a gelatinous layer. ( ) *(Giza & Fayoum 2017)*
7. The central nervous system consists of the brain and the spinal cord. ( )
8. The cerebellum is the main control center in your body. *(Sohag 2016)* ( )
9. The ribcage is the bony box, where the brain is protected. ( )
10. The brain directs and coordinates all the processes, ideas and emotions. ( )
11. The brain consists of cerebrum, cerebellum and medulla oblongata. ( )
12. The outer part of the brain is a white matter. ( )
13. The two cerebral hemispheres are the largest part of the brain. ( )
14. The outer surface of the hemispheres is called cerebellum. ( )
15. One of the most important functions of the muscular system is controlling the voluntary movements. *(Giza 2016)* ( )
16. The centers of thinking and memory lie in the spinal cord. *(Menofia 2017)* ( )
17. The location of cerebellum is at the back of the brain over the two cerebral hemispheres. *(Giza 2017)* ( )
18. The cerebellum is responsible for keeping the balance of the human body during its movement. *(Cairo & Ismailia 2017)* ( )
19. The location of medulla oblongata is below cerebellum and joins brain the with the spinal cord. ( )
20. The spinal cord is responsible for reflex action in human body. ( ) *(Luxor 2016)*
21. The spinal cord controls the heartbeats. *(Sharkia 2017)* ( )
22. The gray matter in the spinal cord takes the shape of letter "H". *(Cairo 2013)* ( )

23. The spinal cord consists of an internal substance that is white matter and it appears in the shape of letter "H". *(Menofia 2017)* (   )
24. The automatic response of the body to the external stimuli is known as the reflex action. (   )
25. The peripheral nervous system consists of 43 pairs of nerves. (   )
26. There are 12 pairs of spinal nerves and 31 pairs of cranial nerves. (   ) *(Damietta 2011)*
27. The spinal cord is responsible for regulating the involuntary processes. *(Damietta & Beni Suef 2016)* (   )
28. Secreting saliva on seeing or smelling good food is a voluntary response. (   )

4. Write the scientific term of each of the following :

1. The system which is responsible for the communication and coordination between human body systems. *(Kalyoubia 2017)* (...............)
2. A system that consists of the brain, the spinal cord and the nerves. *(Sohag 2016)* (...............)
3. The system which receives information from the environment and makes the body respond to it. (...............)
4. The building unit of nervous system. *(Cairo & Giza 2017)* (...............)
5. The branches that extend from the neuron body. (...............)
6. The cylindrical axis in the neuron that is covered with a fatty layer. (...............)
7. The fatty layer that covers the axon. (...............)
8. It is the net that is formed by the connection of dendrites with neighbouring neurons. (...............)
9. The system that consists of the brain and the spinal cord. (...............) *(Sohag 2011)*
10. The main control center in the human body. *(Ismailia 2017)* (...............)
11. The part of the brain which is divided into two hemispheres. (...............)
12. The outer layer of the two cerebral hemispheres. (...............)
13. An organ contains the centers of thinking and memory. (...............)
14. The structure that receives the nerve impulses from the sense organs. (...............)
15. A part of the brain which is responsible for keeping the balance of the human body. *(Alex. 2017)* (...............)



16. A part of the brain that lies at the back area of the brain below the two hemispheres. *(Cairo 2011)* (...............)
17. A part of the brain that regulates the heartbeats. *(Menofia 2015)* (...............)
18. 12 pairs of nerves that extend from the brain. (...............)
19. 31 pairs of nerves that extend from the spinal cord. (...............)
20. The system that consists of 43 pairs of nerves. (...............)
21. A part of the nervous system that responsible for the transfer of nervous message from different parts of the body to the brain and vice versa. (...............)
22. An involuntary response made by the nervous system when the body is subjected to an external stimulus. *(Sohag 2017)* (...............)
23. The internal H-shaped part of the spinal cord. (...............)
24. 📖 A part of the nervous system responsible for reflex actions. (...............) *(Cairo & North Sinai 2017)*
25. 📖 The basic structural unit of the nervous system. (...............) *(Sharkia 2017)*
26. 📖 A structure links the brain with the spinal cord and is responsible for the involuntary actions. *(Menofia 2017)* (...............)
27. 📖 It consists of gray matter in the form of letter "H" surrounded by a white matter. *(Matrouh 2017)* (...............)
28. 📖 The automatic (spontaneous) response of the body to different stimuli. *(Damietta 2017)* (...............)
29. The bony box, in which the brain is located. (...............)
30. Bad behaviour that causes sluggishness and retardation of memory and learning. (...............)

5. Complete the following statements :

1. .... is the system that controls all the vital operations of the body.
2. The building unit of the nervous system is the .... cell that is called ....
3. .... is the structural unit of the nervous system.
4. The neuron consists of two main parts which are .... and .... *(Beni-Suef 2017)*
5. The cell body contains .... , ... and plasma membrane, while there are .... extending from it.



6. The dendrites are connected to neighbouring neurons composing the .... *(Sharkia 2016)*
7. The axon of nerve cell is surrounded by .... sheath. *(Suez & Qena 2016)*
8. At the axon endings, there are .... that are connected to the muscles or form .... with other neurons.
9. The nervous system consists of two main systems which are .... and .... *(Ismailia 2016)*
10. The central nervous system consists of .... and .... *(Gharbia & Dakahlia 2017)*
11. The main control center in your body is .... and it is found inside a bony case called .... *(Assiut & Sharkia 2017)*
12. The brain is a nerve block containing millions of ....
13. The brain and the spinal cord represent ....
14. .... is a bony box, where the brain is located.
15. The brain consists of .... , ... and .... *(Suez 2017)*
16. The outer part of the brain is .... matter , while the inner part is .... matter.
17. .... is the largest part of the brain and it is divided into two halves called ....
18. The function of .... is the protection of the brain.
19. The two cerebral hemispheres have many .... and .... on their surface.
20. The hemispheres control the .... movements such as ....
21. .... receive the nerve impulses from sense organs and send a suitable responses.
22. The cerebrum contains the centers of .... and ....
23. The .... lies below the two cerebral hemispheres.
24. The .... maintains the balance of the body during the movement. *(El-Dakahlia 2011)*
25. The brain and the spinal cord are connected by the ....
26. The structure that lies in front of the cerebellum is called ....
27. The .... is responsible for regulating the involuntary processes of the body such as heartbeats and ....
28. The spinal cord extends inside a channel within the ....
29. The .... delivers the nerve messages from the body organs to the brain and vice versa.



30. .... controls the reflex actions (reflexes). *(Menofia 2017)*
31. The outer part of the hemispheres is .... matter, while the outer part of the spinal cord is .... matter.
32. The gray matter in the spinal cord has the shape of .... and is surrounded with .... *(Luxor 2012)*
33. The nerves that emerge from the brain and the spinal cord represent ....
34. The peripheral nervous system consists of .... and .... nerves. *(Aswan 2016)*
35. The number of cranial nerves is .... and the number of spinal nerves is .... *(Sharkia & Sohag 2017)*
36. The .... is the involuntary response that made by the nervous system when the body is subjected to an external stimulus.
37. .... is responsible for the reflex actions, while .... is responsible for regulating the movements and functions of the digestive system.
38. .... nervous system delivers the sensory information and the kinetic responses between .... and all the body parts.
39. The withdrawal of your hand away from the plant thorns is called ....
40. Blinking when something gets close to the eye is example of ....
41. The over intake of tea and coffee causes .... and .... *(Alex. 2015)*
42. It is preferable to stay away from .... and stimulants to maintain the human nervous system.

6. Give reasons for the following :

1. Dendrites extend from the neuron's body.

   ....

2. The axon ends in nerve endings.

   ....

3. Brain is the main control center in the human body. *(El-Menofia 2011)*

   ....

4. Brain is located inside the skull. *(Giza 2014)*

   ....

5. The cerebrum helps you to win in races.

   ....

6. The medulla oblongata keeps you alive during sleeping.

   ....

   ....

7. Cerebrum is a very important part of the brain.

8. Cerebellum has a great importance during the movement of the body. *(Assiut 2013)*

9. The medulla oblongata helps in digestion.

10. The spinal cord extends through the inside of the backbone.

11. 📖 Damage of medulla oblongata leads to death. *(Giza 2017)*

12. It is important to prevent exhausting the sensory organs.

13. You must stay away from the sources of pollution.

14. You must reduce the intake of the stimulating substances such as tea and coffee. *(Ismailia 2017)*

15. You must sleep for sufficient periods of time. *(Cairo 2012)*

16. 📖 It is important not to take sleeping pills without the doctor's prescription.

17. 📖 The withdrawal of the hand quickly when it touches a hot surface. *(Giza 2016)*

18. Addiction passively affects the nervous system.

19. The nervous system has a special importance in the human body.

7. What happens when ...?

1. The absence of dendrites and axon terminals.

2. Damage of medulla oblongata. *(Luxor & El Minia 2017)*
....
3. The cerebellum is shocked hardly.
....
4. 📖 Your finger gets pricked by the plant thorns. *(Aswan 2016)*
....
5. 📖 Approaching something to your eye.
....
6. Your hand suddenly touches a very hot surface. *(Ismailia & Gharbia 2017)*
....
7. The body does not take a sufficient period of rest.
....
8. 📖 Sitting for long times in front of the computer. *(Aswan 2012)*
....
9. 📖 Continuous exposure to contaminated air by the factories smoke. *(Cairo 2017)*
....
10. The over intake of stimulant materials such as tea and coffee. *(North Sinai & Sohag 2017)*
....
11. Human is exposed to noise constantly. *(Aswan 2017)*
....
12. Taking drugs. *(Damietta 2017)*
....

8. What is the importance (function) of each of the following ?

1. The neuron. *(Dakahlia 2015)*
....
....
2. The brain. *(Suez 2011)*
....
....
3. 📖 Cerebrum (the two hemispheres). *(Damietta 2017)*
....
....
4. Dendrites and axon terminals.
....
....

5. Cerebellum. *(Kalyoubia & Kafr El-Sheikh 2017)*
....
6. Medulla oblongata. *(Damietta 2015)*
....
7. Spinal cord. *(Red Sea 2017)*
....
8. The peripheral nervous system. *(Kafr El-Sheikh 2016)*
....
9. Reflex action.
....
10. Skull. *(El-Sharkia 2011)*
....
11. Vertebrae in the backbone.
....
12. The nervous system. *(El-Behira 2011)*
....

9. What is meant by each of the following ... ?

1. The nervous system.
....
2. Neuron.
....
3. The brain.
....
4. Peripheral nervous system.
....

5. Reflex action. *(El-Kalyoubia 2012)*

....

....

10. Locate each of the following parts in the human body :

1. The brain.

....

2. 📖 The two cerebral hemispheres.

....

3. 📖 The cerebellum. *(Alex. 2011)*

....

4. 📖 The medulla oblongata. *(El-Sharkia 2013)*

....

5. 📖 The spinal cord. *(El-Sharkia 2013)*

....

6. 📖 The H-shaped gray matter.

....

7. The cerebral cortex.

....

8. Dendrites.

....

9. Axon terminals.

....

11. Compare between :

1. The brain and the spinal cord.

....

....

....

....

2. The structure of the spinal cord and the structure of the two cerebral hemispheres.

....

....

....



3. Cranial nerves and spinal nerves. *(Port Said 2017)*

....

....

....

4. Central nervous system and peripheral nervous system. *(Giza 2016)*

....

....

....

....

12. Examine the opposite figure :

1. What does this figure represent ?

....

2. Label the figure :

① .... ② ....

③ ....

3. State the function of organs no. ① and ②.

....

....

....

13. Observe the opposite figure, then complete : *(Assiut 2017)*

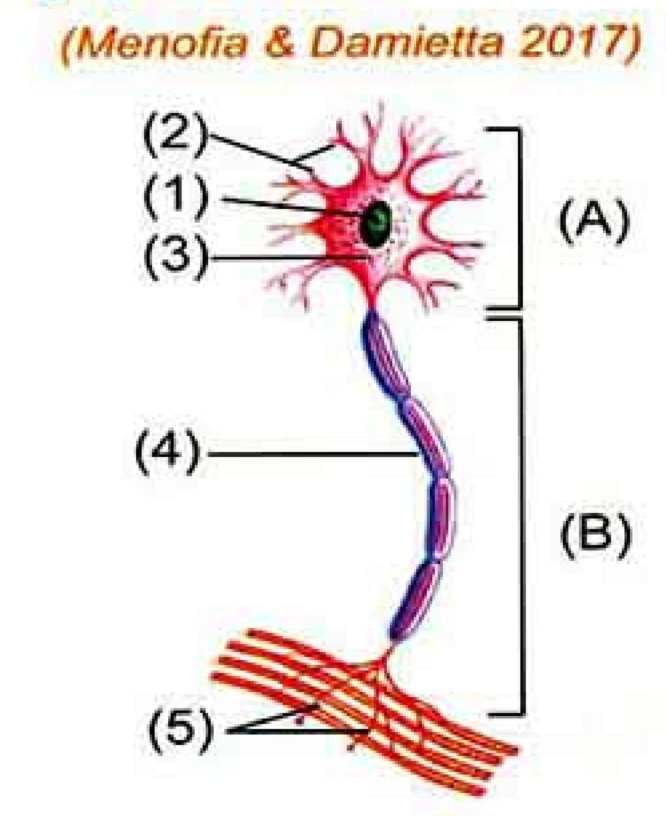
1. This figure represents ....
2. Write the labels

ⓐ .... ⓑ ....

3. The structures ⓐ and ⓑ are located in the ....

14. Look at the opposite figure ,then answer the following questions :

(Menofia & Damietta 2017)



1. This figure indicates the structure of ....
2. Complete :
   - Part (A) represents the ....
   - Part (B) represents the ....
3. Write the labels.
   (1) .... (2) ....
   (3) .... (4) ....
   (5) ....

15. Look at the opposite figure, then answer the following questions :

(Beni-Suef 2017)

1. Label the figure :



① .... ② ....

③ ....

2. What is the function of part ② ?

....

....

16. Mention five different ways of maintaining the human nervous system.

(Dakahlia & Behiera 2017)

....

....

....

....

Timss Questions



1. The drunk person (affected by alcohol) loses :

- first,his ability to talk.
- second, his ability to walk in straight line.
- third his, ability to breathe normally.

So, the right arrangement of alcohol effect on the parts of the central nervous system is :

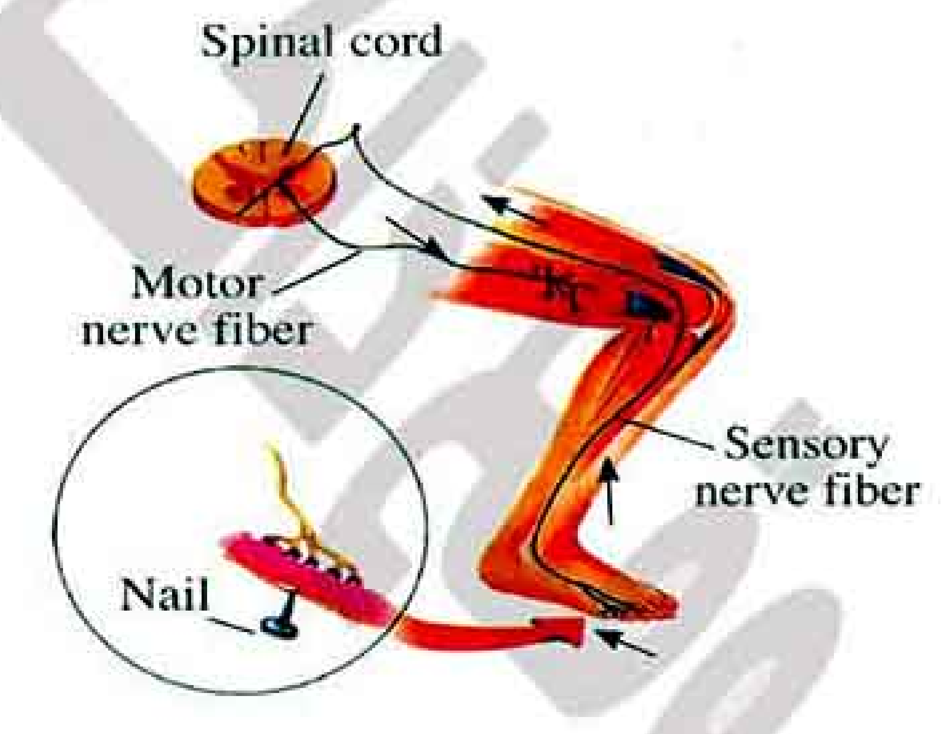
a. medulla oblongata – cerebellum – cerebrum.

b. cerebrum – cerebellum – medulla oblongata.

c. cerebellum – medulla oblongata – cerebrum.

d. cerebellum – cerebrum – medulla oblongata.

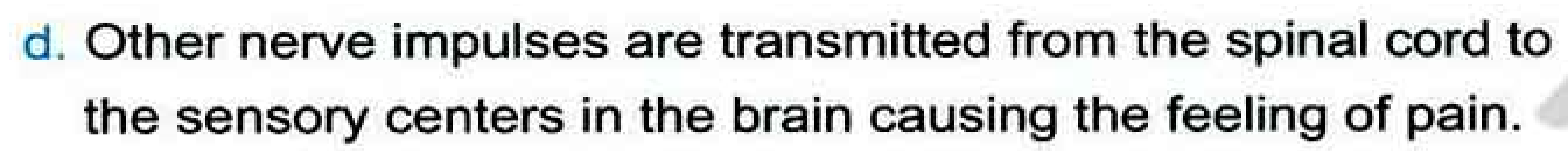
2. **The opposite figure shows a case of reflex action to a person stepping his foot on an iron nail. Rearrange the following statements:**



a. Other nerve impulses transmit in a motor nerve fiber from the spinal cord to the muscles of the foot.

b. Nerve impulses are generated in the nerve endings of the cells that exist in the foot.

c. The muscles contract to move the foot away from danger.



d. Other nerve impulses are transmitted from the spinal cord to the sensory centers in the brain causing the feeling of pain.

e. The nerve impulses transmit in a sensory nerve fiber to the spinal cord.

....



1 Lesson

3. **The following table explains three parts of the nervous system. Read them carefully then choose the correct answer.**

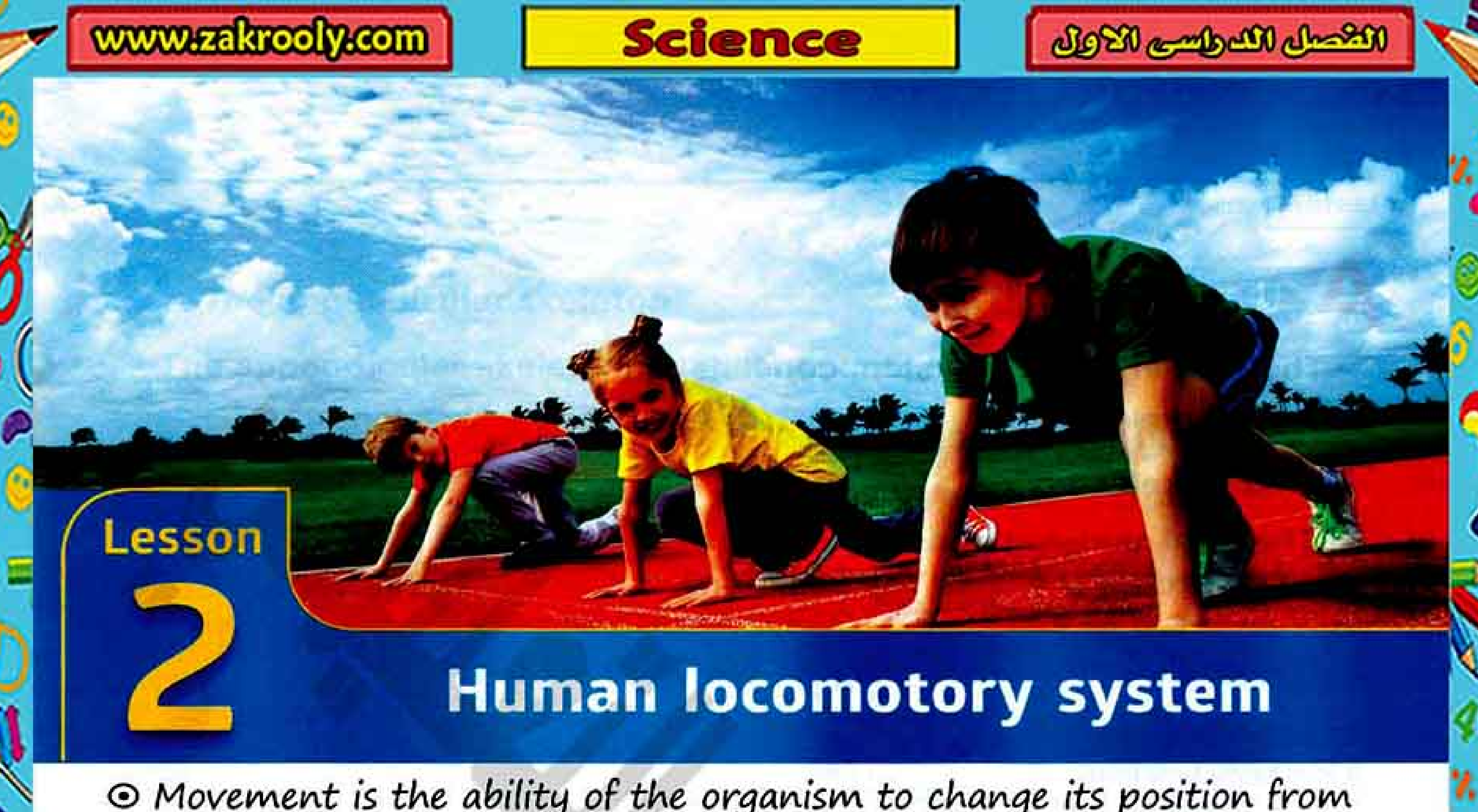
Part ①	Part ②	Part ③
- It connects the brain with the spinal cord.	- Its outer surface is called cerebral cortex.	- It extends in a channel within a series of vertebrae in the backbone.
- It regulates the involuntary processes of the human body.	- It contains the centers of thinking and memory.	- It controls the reflex action of the human body.

a. Part ① is spinal cord, Part ② is medulla oblongata and Part ③ is cerebrum.

b. Part ① is cerebrum, Part ② is medulla oblongata and Part ③ is spinal cord.

c. Part ① is medulla oblongata, Part ② is cerebrum and Part ③ is spinal cord.

d. Part ① is medulla oblongata, Part ② is spinal cord, and Part ③ is cerebrum.



Lesson 2 Human locomotory system

- Movement is the ability of the organism to change its position from one place to another.
- Movement is one of the characteristics that distinguishes living organisms from non-living things and it occurs with participation and integration of skeletal, muscular and nervous systems.

Structure of human locomotory system

- The movement of our bodies depends on ***muscles*** and ***bones*** together.

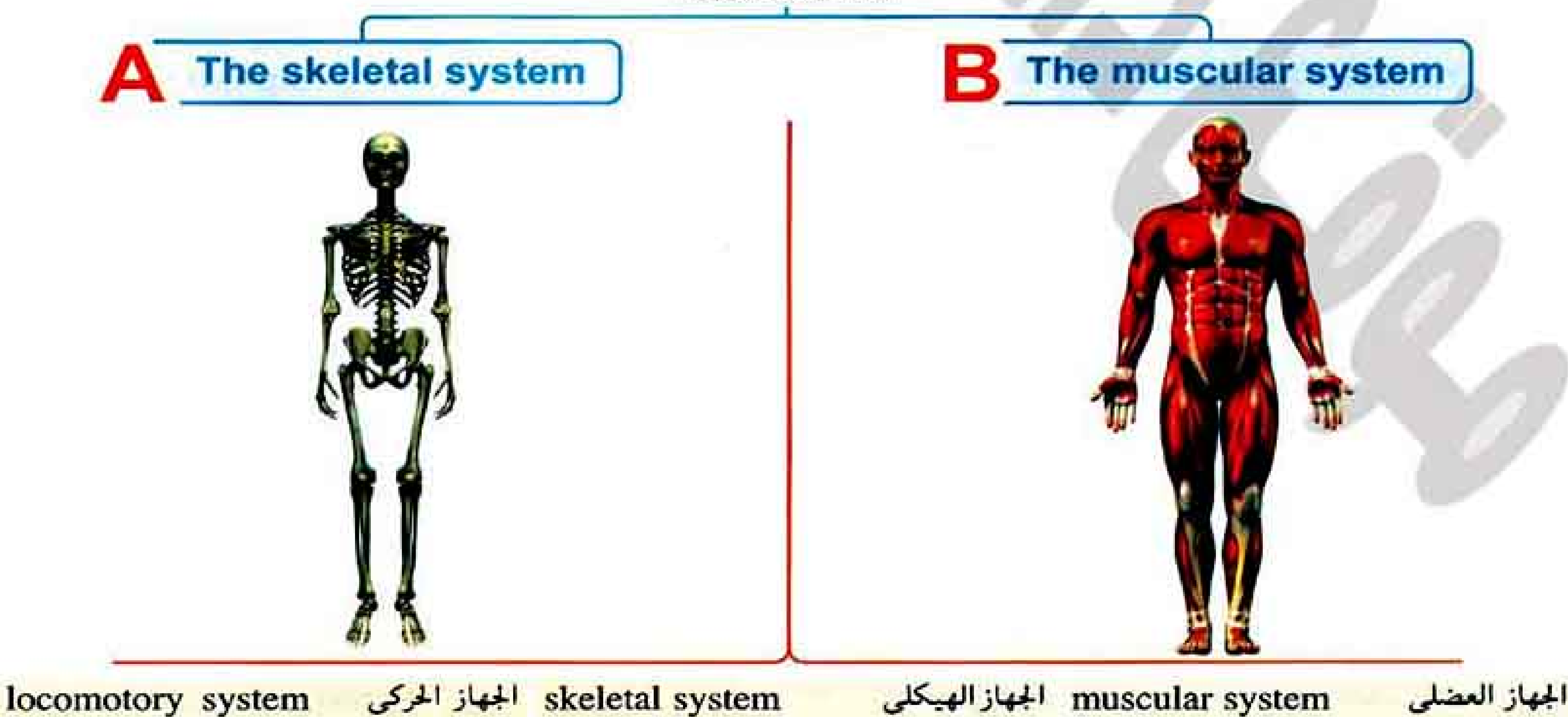
SO, locomotory system consists of two major systems :

The locomotory system

consists of

A The skeletal system

B The muscular system



locomotory system	الجهاز الحركى	skeletal system	الجهاز الهيكلى	muscular system	الجهاز العضلى
integration	تكامل	participation	مشاركة	ability	القدرة



2
Lesson

A The skeletal system

- **The human skeletal system consists of :**

1. Axial skeleton. **2.** Appendicular skeleton.

1 Axial skeleton

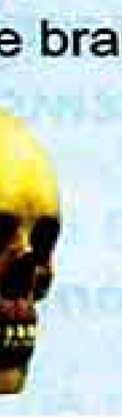
- **The axial skeleton consists of :**

a. **The skull.** b. **The backbone.** c. **The ribcage.**

a. The skull.

Its structure :
It is a bony box that contains cavities for eyes, ears and nose.

Its function :
It protects the brain.



b. The backbone.

- It represents the axis of the skeleton.

Its structure :
- It consists of 33 vertebrae.
- It contains cartilages between vertebrae, *to prevent their friction during motion.*

Vertebra
Cartilage

Its function :
1. It allows the body to bend in different directions.
2. It protects the spinal cord.



c. The ribcage.

Its structure :
- It consists of 12 pairs of ribs (or 24 ribs).
- The first 10 pairs are connected to the sternum (breast bone) anteriorly.

Its function :
1. It protects the lungs and the heart.
2. It helps in the inhalation and exhalation processes (breathing).

Sternum
Ribs

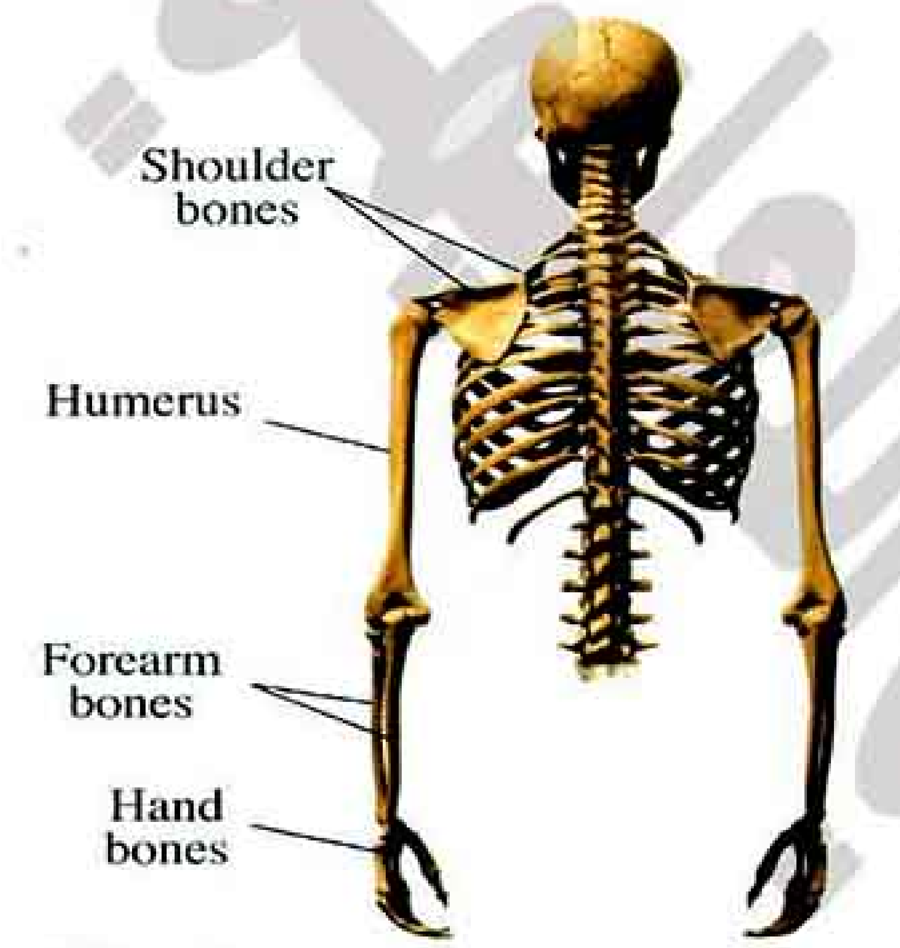
axial skeleton	الجهاز الهيكلى المحورى	appendicular skeleton	الجهاز الهيكلى الطرفى	skull	الجمجمة
backbone	العمود الفقرى	ribcage	القفص الصدرى	cavities	تجويفات
vertebrae	فقرات	cartilages	غضاريف	ribs	ضلوع
anteriorly	أمامياً				

2 The appendicular skeleton

• **The appendicular skeleton consists of :**

a. Bones of upper limbs :

They are connected to **shoulder bones**.



Structure :

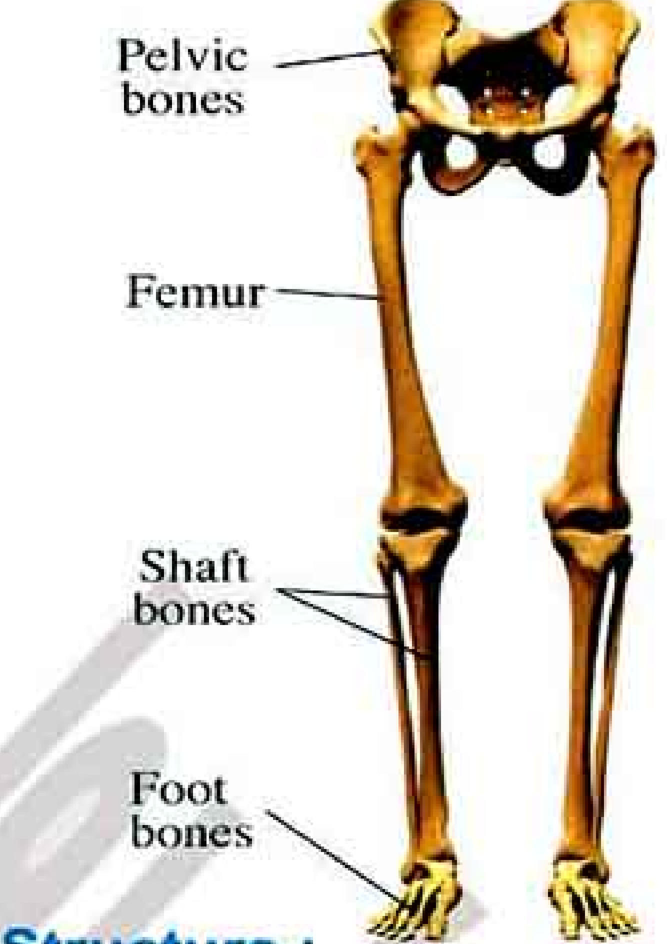
Each upper limb consists of humerus bone , forearm bones and hand bones.

Function :

Allow eating, drinking, writing and holding things.

b. Bones of lower limbs :

They are connected to **pelvic bones**.



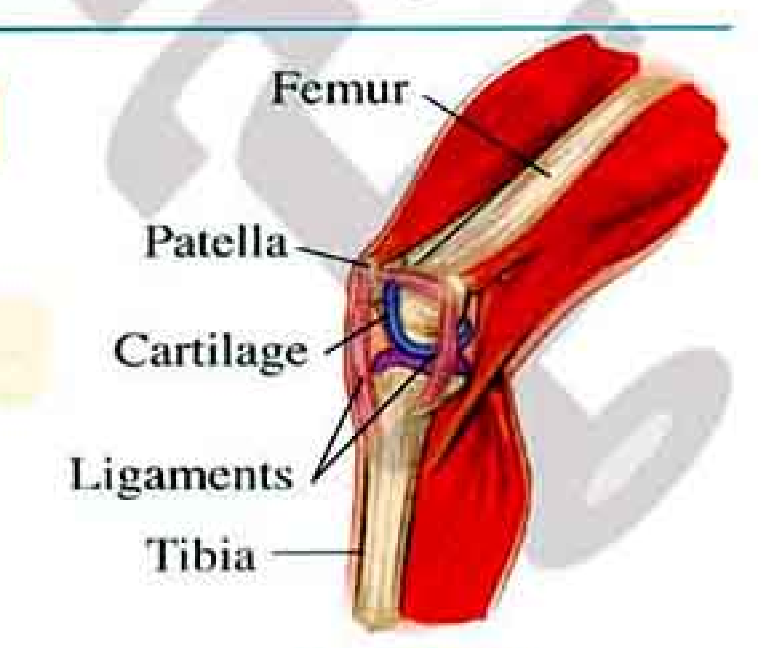
Structure :

Each lower limb consists of femur bone, shaft bones and foot bones.

Function :

Allow walking, running, standing and carrying the rest of the body.

Joints and their significance to movement



Knee joint

The joint

It is the location at which bones meet each other.

The function of joints :

They allow the movement between bones.

limbs	الأطراف	significance	أهمية	location	موضع	femur	الفخذ
humerus bone	عظمة العضد	pelvic bone	عظمة الحوض	knee	الركبة	joints	مفاصل
shaft	الساق	forearm	الساعد	shoulder bone	عظمة الكتف		



2
Lesson

Types of joints

There are three types of joints which are :

1. Immovable joints

- They don't allow any movement.

Examples :
The joints between the bones of skull.



2. Slightly movable joints

- They allow movement in one direction only.

Examples :
Knee and elbow joints.



3. Freely movable joints

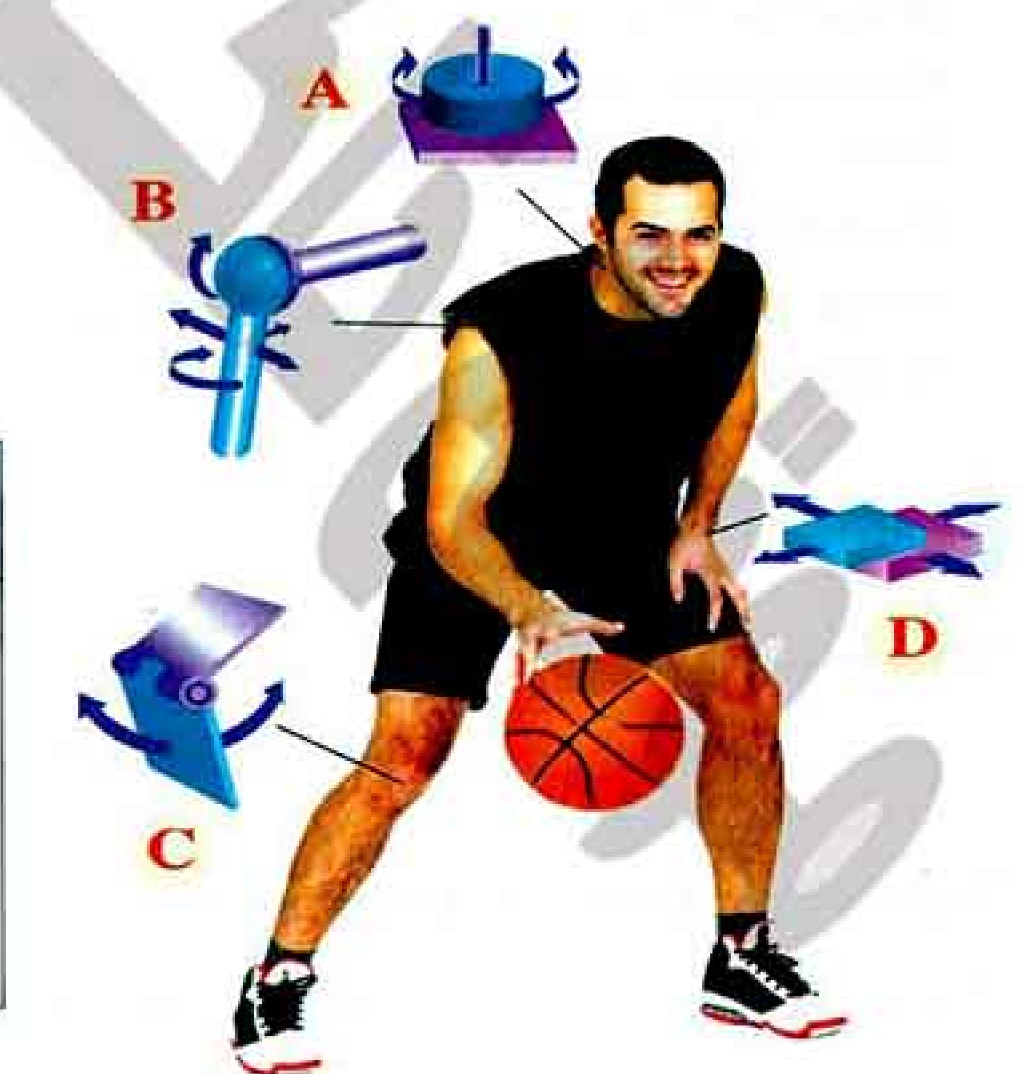
- They allow movement in all directions.

Examples :
Shoulder, wrist and thigh (hip) joints.



Application :

- Look at the opposite picture, then complete the following table :



The joint	Type of joint	Direction of movement
A	Freely movable	In all directions
B	....	In all directions
C	Slightly movable	....
D	....	In all directions

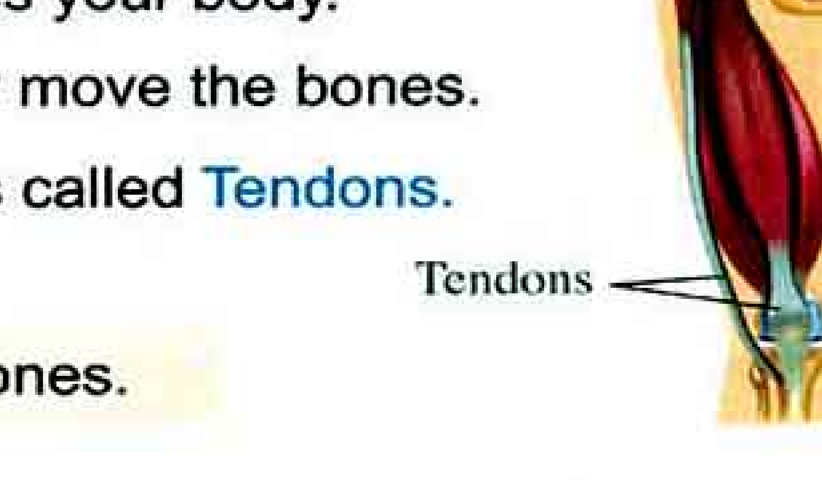
immovable	غير متحرك	slightly	خفيف	movable	متحرك
elbow	الكوع	wrist	الرسغ	thigh / hip	الفخذ

B The muscular system

- The muscular system is the engine that moves our body, where the contraction and relaxation of muscular cells generate the mechanical energy that moves your body.

SO, when muscles contract and relax they move the bones.

- Muscles are fixed with bones by long strips called Tendons.



Tendons:

They are long strips that fix muscles to bones.

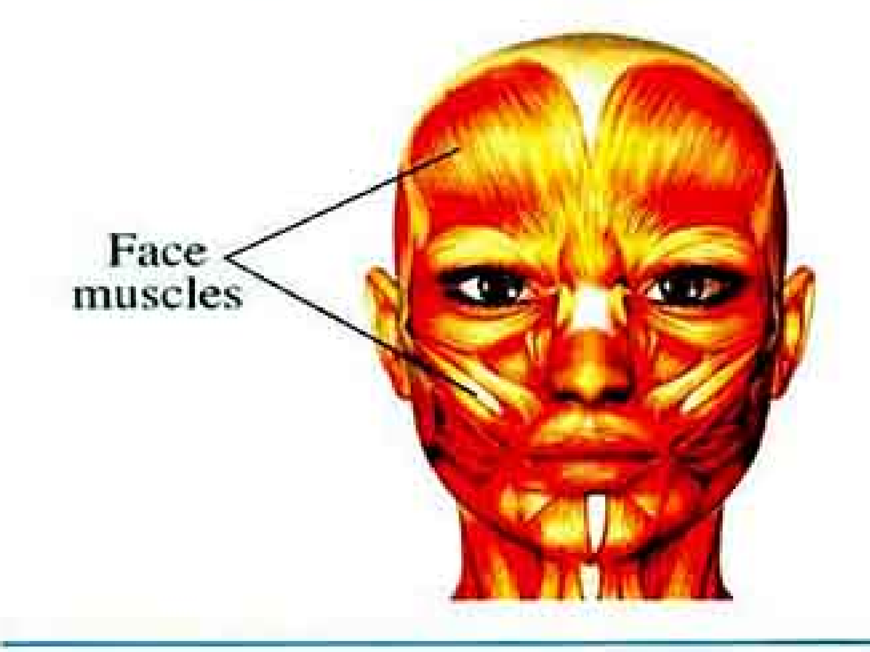
Types of muscles

1. Voluntary muscles :

They are the muscles that can move willingly and you can control its movement.

Examples

1. Limbs muscles.
2. Trunk muscles.
3. Face muscles.
4. Abdominal wall muscles.

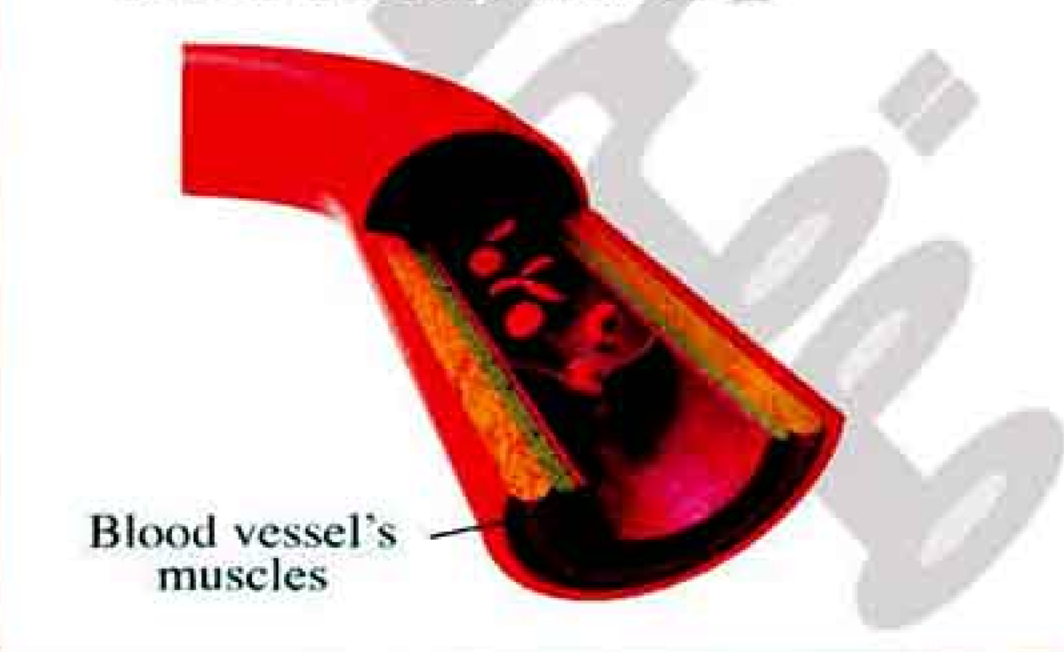


2. Involuntary muscles :

They are the muscles that move automatically and you can't control or even be aware of their movements.

Examples

1. The gastrointestinal tract (alimentary canal) muscles.
2. The blood vessel's muscles.
3. The bladder muscles.



engine	محرك	mechanical energy	الطاقة الميكانيكية (الحركية)	tendons	الأوتار
voluntary	إرادى	involuntary	لا إرادى	trunk	الجذع
gastrointestinal tract	القناةالهضمية	willingly	اختيارى	abdominal wall	جدار البطن
aware	مدرك / واع				



2
Lesson

Do you know ?

- The human body contains 650 muscles. The biggest muscle in size is at the bottom of the body, while the smallest is in the ear.
- Humans use 200 muscles during walking.

The role of muscles in the movement of the forearm :




Examine the opposite figures (a) and (b), then observe :

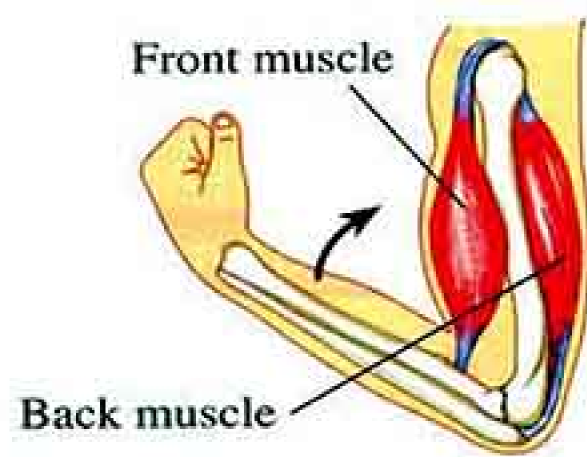


fig. (a)

In figure (a) :

- The front muscle contracts and the back muscle relaxes.

➡ This causes the bending (moving up) of the arm by the help of elbow joint.

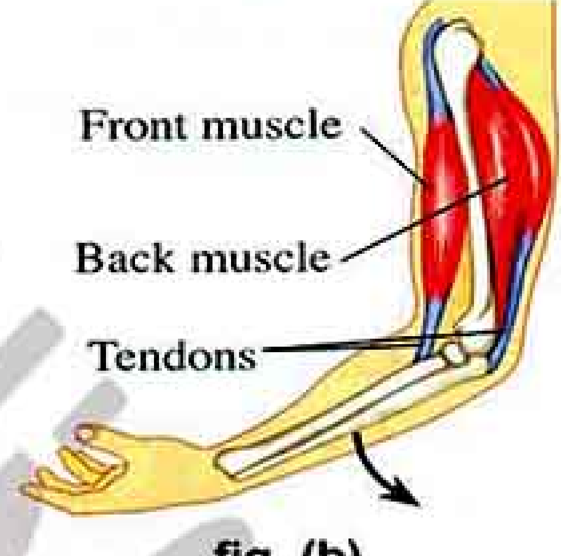


fig. (b)

In figure (b) :

- The front muscle relaxes and the back muscle contracts.

➡ This causes extending (moving down) of the arm by the help of elbow joint.

In both figures :

The effect of the contraction or the relaxation of muscles is transferred to the elbow joint bones by the tendons that links between muscles and bones.

Exercise

Complete the following sentences :

1. *The axial skeleton consists of .... , ... and ....*
2. *.............. are long strips that fix muscles with bones.*
3. *The gastrointestinal tract muscles are from the .... muscles.*
4. *Elbow joint is considered from .... joints, while the shoulder joint is considered from .... joints.*



How can you maintain your locomotory system ?

1 The commitment to vaccinating children according to Ministry of health's instructions as well as giving children polio vaccinations at accurate times.



2 Eating healthy food rich in calcium, phosphorus and vitamin D. G.R.

➡ To prevent bone diseases such as osteomalacia and rickets.



3 Avoid jumping from high places and making violent movements. G.R.

➡ To avoid fractures and sprains.



4 Avoid carrying heavy things that exceed your ability. G.R.

➡ To protect the skeleton, especially the backbone.



osteomalacia	لين عظام	rickets	الكساح	fractures	الكسور
sprain	التواء	violent	عنيف	straining	إرهاق
maintain	يحافظ على	commitment	إلتزام	vaccinating	تطعيم
instructions	تعليمات	ministry of health	وزارة الصحة	polio	شلل الأطفال
accurate	دقيق				

2
Lesson

5 Sitting and standing correctly during studying or reading. G.R.

➡ To avoid straining the neck or backbone vertebrae.



6 Exposing the body to sunlight for suitable periods. G.R.

➡ Due to the importance of sunlight in providing the body with vitamin D.



7 Exercising regularly.



8 Avoid stress muscles, such as sitting on one side for a long time.

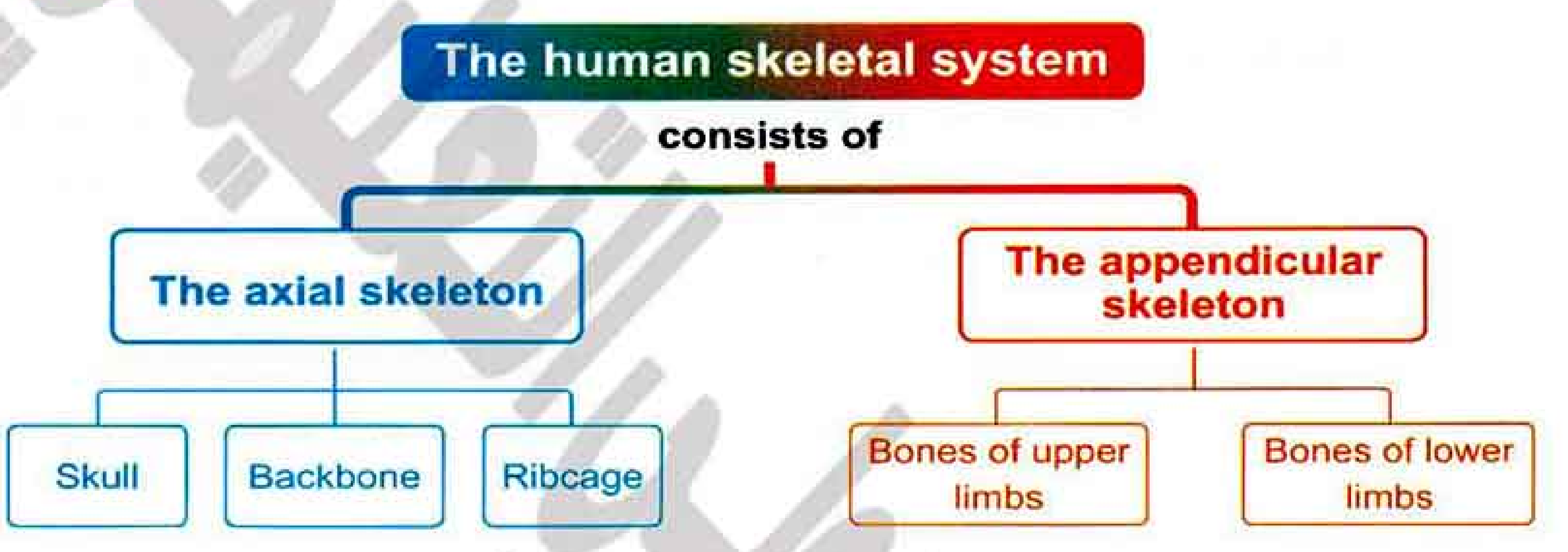


Try to answer :
* Test yourself 13
* General exercise of the school book on unit 4
* Model exams on unit 4

Remember



- The human locomotory system consists of skeletal system and muscular system.



- Skull is a bony box that protects the brain.
- Backbone consists of 33 vertebrae which allow the body to bend in different directions and protect the spinal cord.
- Ribcage consists of 12 pairs of ribs which protect the lungs and the heart and help in the inhalation and exhalation processes.
- Bones of upper limbs are humerus bone, forearm bones and hand bones.
- Bones of lower limbs are femur bone, shaft bones and foot bones.
- **Immovable joints** don't allow any movement, **slight movable joints** allow movement in one direction only, while **freely movable joints** allow movement in all directions.
- Voluntary muscles can move willingly , while involuntary muscles move automatically.
- Muscles are fixed with bones by long strips called tendons.





Questions on lesson two

Questions signed by [book icon] have been taken from the school book.

1. Choose the correct answer :

1. .... is the ability of the organism to change its position from a place to another.
   a. Respiration b. Movement c. Digestion d. Feeling
2. .... system(s) is (are) responsible for the movement of the human body.
   a. Nervous b. Skeletal c. Muscular d. (a) , (b) and (c)
3. The .... consists of skull, backbone and ribcage.
   a. axial skeleton b. vertebral column
   c. appendicular skeleton d. the muscular system
4. The axial skeleton consists of all the following, except .... *(Alex. 2016)*
   a. the skull. b. the vertebral column.
   c. the limbs bones. d. the ribcage
5. The skull function is the protection of the ....
   a. lungs. b. brain. c. heart. d. backbone.
6. The human backbone consists of .... vertebrae. *(Cairo & Sharkia 2016)*
   a. 13 b. 23 c. 43 d. 33
7. Backbone protects the ....
   a. spinal cord. b. brain. c. eyes. d. heart.
8. All the following are from the constituents of the human skeletal system except .... *(El-Fayoum 2014)*
   a. joints. b. backbone. c. spinal cord. d. the ribcage.
9. The ribcage in man consists of .... pairs of ribs. *(Giza & Sharkia 2017)*
   a. 11 b. 12 c. 13 d. 14
10. The human ribcage protects the ....
    a. heart. b. lungs. c. brain. d. (a) and (b)
11. The human ribcage helps in .... process.
    a. digestion b. sensation
    c. breathing d. no correct answer

12. The first 10 pairs of ribs are connected to the .... bone.
 a. humerus b. sternum c. femur d. shaft
13. Humerus bone belongs to the bones of ....
 a. upper limb. b. lower limb. c. axial skeleton. d. skull.
14. The bones of upper limb are connected to the .... bones.
 a. shoulder b. sternum c. humerus d. femur
15. Femur bone is attached to .... bones. *(Beni Suef 2014)*
 a. shoulder b. pelvic c. ribcage d. humerus
16. The bones of the .... allow eating and writing.
 a. lower limbs b. legs c. upper limbs d. joints
17. The location in which the bones meet together is called ....
 a. tendon. b. joint. c. humerus. d. skull.
 (Damietta & Beni-Suef 2016)
18. 📖 The joint is the location of meeting .... *(El-Dakahlia 2011)*
 a. two bones. b. a muscle with a bone.
 c. two muscles. d. no correct answer.
19. 📖 The skull joints are .... *(Qena 2016)*
 a. immovable. b. slightly movable.
 c. free movable. d. no correct answer.
20. The joint which allow the movement in one direction only is ....
 a. immovable. b. freely movable. *(Luxor 2017)*
 c. widely movable d. slightly movable.
21. Which of the following bones related to the axial skeleton ? ....
 a. Humerus. b. Femur. c. Forearm. d. Vertebrae.
22. From the examples of freely movable joints .... *(Cairo & Sharkia 2017)*
 a. knee b. thigh c. elbow d. all the previous
23. Which of the following is from slightly movable joints ? .... *(Sohag 2017)*
 a. Thigh. b. Wrist. c. Ankle. d. Knee.
24. Which of the following joints has limited movement ? .... *(Alex. 2015)*
 a. Shoulder. b. Wrist. c. Elbow. d. Thigh.
25. All the following muscles are voluntary muscles except the .... muscle(s).
 a. limbs b. trunk c. abdominal wall d. blood vessels

26. .... fix muscles with bones. *(Damietta 2017)*
    a. Tendons b. Joints c. Muscle fibers d. (a) and (b)

27. Eating healthy food rich in vitamin .... prevents bone diseases such as osteomalacia and rickets.
    a. A b. B c. C d. D

28. All the following are necessary in maintaining the locomotory system except ....
    a. giving the children polio vaccinations at accurate times.
    b. exercising regularly.
    c. carrying heavy things that exceed your ability.
    d. exposing your body to sunlight.

29. Exposure to sunlight for suitable periods provides the body with vitamin ....
    a. A b. B c. D d. E

2. Join from column (A) what is suitable from column (B) :

(A)	(B)
1. Vertebral column.	a. prevent friction between vertebrae.
2. Ribcage.	b. are the positions in which bones meet.
3. Tendons.	c. long strips join between muscles and bones.
4. Joints.	d. consists of 33 vertebrae.
5. Cartilages.	e. consists of 12 pairs of ribs.
6. Slightly movable joints.	f. allow movement in one direction only.
7. Freely movable joints.	g. allow movement in all directions.
	h. protect the brain and all head organs.

1. .... 2. .... 3. .... 4. ....
5. .... 6. .... 7. ....

3. Put (✓) or (×) in front of the following statements , then correct the underlined words in the wrong ones :

1. The human locomotory system consists of the skeletal system and the <u>muscular</u> system. ( )
2. The skull contains cavities for <u>eyes, ears and nose</u>. ( )

3. Backbone consists of 31 pairs of ribs. *(Red Sea 2017)* (   )
4. Ribcage consists of 12 pairs of vertebrae. *(Assiut 2016)* (   )
5. The ribcage helps in inhalation and exhalation processes. (   )
6. There are ribs between the backbone vertebrae. (   )
7. The function of cartilages is to prevent the friction between bones during motion. *(Kafr El-Sheikh 2017)* (   )
8. The backbone protects the sternum. (   )
9. The bones of lower limb consist of humerus, forearm bones and hand bones. *(Dakahlia 2017)* (   )
10. Tendons are the sites of bones meeting. (   )
11. Joints link bones and muscles. *(Gharbia 2016)* (   )
12. The skull has freely movable joints. *(El-Gharbia 2012)* (   )
13. Shoulder joint is an immovable joint. *(El-Behira & El-Menofia 2016)* (   )
14. Knee joint is a freely movable joint. *(Matrouh 2017)* (   )
15. The appendicular skeleton consists of the skull, backbone and ribcage. (   )
16. Immovable joints allow movement in all directions. *(El-Behira 2014)* (   )
17. Muscles play an important role in human movement. *(Aswan 2014)* (   )
18. Muscles which work automatically are called voluntary muscles. (   )
19. Elbow joint is an immovable joint. *(El-Fayoum 2016)* (   )
20. The muscles of the gastrointestinal tract and that of the blood vessels are considered voluntary muscles. *(Cairo 2012)* (   )
21. Exposing the body to sunlight provides the body with vitamin D. (   )

4. Write the scientific term :

1. The main system that is responsible for the body movement. (..............)
2. The system which consists of skeletal and muscular systems. (..............)
3. The system which consists of axial and appendicular skeletons. (..............)
4. The skeleton ,where the skull is related. (..............)
5. The structure which consists of the skull, backbone and ribcage. *(Sohag 2013)* (..............)
6. The axis of the skeleton in the human body. (..............)
7. A bony case that contains brain. *(Ismailia & Damietta 2016)* (..............)
8. The structure which protects the spinal cord. (..............)
9. The structure which protects the heart and lungs. *(Dakahlia 2016)* (..............)
10. The structure which consists of 33 bony vertebrae. *(South Sinai 2017)* (..............)



11. The part of the skeletal system which helps in inhalation and exhalation processes. (...............)
12. The part of the axial skeleton which allows the bending of the body in different directions. *(Giza 2016)* (...............)
13. The type of skeleton which includes the bones of upper and the lower limbs. *(Luxor & Gharbia 2017)* (...............)
14. Areas between vertebrae of the vertebral column separate and protect vertebrae from friction during movement. *(Alex. 2015)* (...............)
15. The area of two bones meeting. *(Red Sea 2016)* (...............)
16. The joint which doesn't allow any movement.
17. The joint which allows the movement in one direction only. (...............) *(Suez 2015)*
18. The joint which allows the movement in all directions. *(Giza 2015)* (...............)
19. The system which is considered the engine of the body. (...............)
20. The structure (ligaments) by which muscles are fixed to the bones. *(Giza & Assiut 2017)* (...............)
21. The location ,where bones meet and allow moving. *(Alex. 2017)* (...............)
22. Types of muscles act spontaneously (automatically) and cannot be controlled. *(Ismailia 2017)* (...............)
23. The vitamin which produced in the body by the exposure to sunlight. (...............)

5. Complete the following statements :

1. The ability of the organism to change its position from a place to another is called ....
2. Movement occurs with the participation of .... , ... and .... systems.
3. The human locomotory system consists of .... and .... *(Damietta & Beni-Suef 2016)*
4. The human skeletal system consists of .... and .... *(Damietta 2017)*
5. The axial skeleton consists of .... , ... and .... *(Port Said 2017)*
6. .... is a bony box containing .... for eyes , ears and nose.
7. The main function of the skull is to ....
8. The number of vertebrae of vertebral column is .... *(North Sinai 2017)*
9. .... are found between the vertebrae of the vertebral column. *(Alex. 2016)*

10. The cartilages found between vertebrae prevent .... during ....
11. The human ribcage consists of .... pairs of .... *(Cairo 2017)*
12. The .... is the bone, at which the first 10 pairs of ribs are connected anteriorly.
13. The ribcage protects .... and ....
14. .... helps in the inhalation and exhalation processes.
15. The human appendicular skeleton consists of the bones of .... and the bones of ....
16. The bones of upper limb are .... , ... and ....
17. The bones of lower limb are .... , ... and ....
18. The .... is the site of two bones meeting.
19. The types of joints are .... , ... and ....
20. The function of joints is to ....
21. The knee joint is considered from .... joints, while the hip joint is considered from .... joints. *(El-Menofia 2013)*
22. From the slightly movable joints is .... and from the freely movable joints is .... *(Alex. 2016)*
23. Muscles generate .... energy and movement to the body.
24. Muscles are fixed to bones by long strips called .... *(Ismailia 2017)*
25. Bones are moved by the .... and .... of muscles.
26. The muscles that work automatically are known as .... , while that move willingly are known as ....
27. Muscular cells are characterized by their ability to .... and ....
28. When the front muscle of the arm contracts and the back muscle .... , the arm moves ....
29. Face muscles and abdominal wall muscles are from the .... muscles.
30. .... and .... are from voluntary muscles.
31. You must avoid any behavior that leads to fractures such as .... and ....
32. The sunlight is important as it provides us with ....
33. It is essential to eat healthy food which is rich in .... , ... and vitamin "D" to protect yourself from bone diseases. *(Sohag 2017)*



6. Give reasons for the following :

1. The movement is very important to living organisms.

   ....

2. The presence of the brain inside the skull.

   ....

3. There are cartilages between the vertebrae of the backbone. *(Dakahlia 2017)*

   ....

4. The backbone is very important.

   ....

5. The ribcage surrounds both the heart and the lungs. *(Alex. & Kalyoubia 2017)*

   ....

6. The knee joint is a slightly movable joint.

   ....

7. The thigh joint is a freely movable joint.

   ....

8. The joints between the bones of the skull are immovable.

   ....

9. Muscles play an important role in human movement. *(Matrouh 2016)*

   ....

10. The muscular system is considered as the main engine of our bodies.

    ....

11. Muscles are fixed to the bones.

    ....

12. The presence of tendons at the edge of muscles. *(El-Menofia 2012)*

    ....

13. The muscles of our limbs, trunk, face and abdominal wall are voluntary muscles.

    ....

14. We can not control the muscles of alimentary canal, blood vessels and urinary bladder.

    ....

15. Gastro in testinal tract muscles are involuntary muscles. *(Beni-Suef 2017)*

    ....



16. You must eat healthy food that is rich in calcium, phosphorus and vitamin D *(Kalyoubia & Behiera 2017)*

....

17. You must avoid carrying heavy objects that exceed your ability.

....

18. You must sit and stand correctly especially during studying and reading.

....

19. You must expose yourself to sunlight for suitable periods.

....

7. What happens if ...?

1. All the skeletal system bones are one bone (fused). *(Alex. 2012)*

....

2. All the bones of the human body are without joints. *(Dakahlia 2017)*

....

3. Hip (thigh) joint has a limited movement. *(Suez 2013)*

....

4. The shoulder joints is from the limited movement joints. *(El-Menofia 2012)*

....

5. The backbone consists of one long bone.

....

6. The muscles are not fixed to bones.

....

7. The front arm muscle relaxes and the back arm muscle contracts. *(El-Fayoum 2016)*

....

8. Jumping from high places or making violent movements.

....

9. The absence of cartilage between vertebrae of the backbone. *(Ismailia 2014)*

....

8. State the function (importance) of each of the following :

1. The skull. *(South Sinai 2016)*

....

2. The backbone. *(Assiut 2013)*

....

3. The ribcage. *(North Sinai & Fayoum 2017)*

....

4. Bones of upper limbs.

....

5. Bones of lower limbs.

....

6. The joints. *(Assiut 2017)*

....

7. The slightly movable joints.

....

8. The freely movable joints.

....

9. The muscular system. *(Suez 2016)*

....

10. Tendons. *(Kalyoubia 2017)*

....

11. The front arm muscle.

....

12. The back arm muscle.

....

13. Cartilages between the vertebrae of the backbone. *(Aswan & South Sinai 2017)*

....

9. What is meant by each of the following ?

1. The joint.

....

2. Immovable joints.

....

3. Voluntary muscles.

....

4. Involuntary muscles.

....

10. Classify each of the following joints according to their types :

1. Skull joints.. *(Sohag 2012)*
2. Knee joint .... *(Qena 2013)*
3. Elbow joint. .... *(Ismailia 2012)*
4. Wrist joint. ....
5. Thigh (hip) joint. .... *(Ismailia 2012)*
6. Shoulder joint. .... *(Qena 2013)*

11. Examine the opposite figure, then answer : *(Assiut 2013)*

1. The figure represents the .... skeleton and the bones of .... limbs.

2. Label the bones from ① to ⑦. *(Gharbia 2016)*

   ① .... ② ....
   ③ .... ④ ....
   ⑤ .... ⑥ ....
   ⑦ ....

3. Mention the functions of the structures number ④ , ⑤ & ⑥. *(El-Menofia 2014)*

   ....
   ....
   ....

4. Name the joints ⓐ and ⓑ , then mention the type of each one.

   ....
   ....

12. How can you maintain your locomotory system? *(El-Gharbia 2013)*

....
....
....
....

2
Lesson

13. The opposite figures (a) and (b) show the arm in two different cases.

(a) write the names of bones and muscles.

① .... ② ....

③ .... ④ ....

(b) Describe what happens to the muscles in fig. (a) and (b).

fig. (a) fig. (b)

....

....

....

....

14. Examine the opposite figure, then answer : *(Behiera 2017)*

1. The figure represents the bones of .... limbs.
2. Label the numbered bones :

   ① ....

   ② ....

   ③ ....
3. What is the function of the opposite part of the skeletal system ?

   ....

   ....
4. Label the joints ⓐ and ⓑ , then mention their types.

   ....

   ....

Pelvic bones

15. Classify each of the following into voluntary and involuntary muscles :

1. The limbs muscles : ....
2. The muscles of gastrointestinal tract : ....

3. Face muscles : ....
4. The bladder muscles : ....
5. The muscles of the blood vessels : ....

16. Look at the opposite figure, then complete :

1. The figure represents the ....
2. The type of joints in this structure is ....
3. The function of this structure is ....

17. Compare between :

1. The axial skeleton and appendicular skeleton. *(Alex. 2017)*
....
....

2. Voluntary muscles and involuntary muscles. *(New Valley 2017)*
....
....
....
....

3. Wide (freely) movable joints and limited (slightly) movable joints. *(Dakahlia & El-Minia 2016)*
....
....
....
....

4. The upper limbs and the lower limbs in the human being. *(El-Behira 2014)*
....
....
....
....

Timss Questions



1. Among the functions of some parts of the skeletal system is to protect some organs of other systems inside your body.
According to the previous sentence, try to complete the following chart.

1. Lungs —is kept inside→ ....
2. Spinal cord —is kept inside→ ....
3. Brain —is kept inside→ ....
4. Heart —is kept inside→ ....

2. Calcium is a mineral that helps make bones and teeth strong.
Put a tick (✓) in front of the food that is considered a source of calcium.

a. Sweets	☐	b. Milk	☐
c. Rice	☐	d. Cheese	☐
e. Egg	☐	f. Oil	☐

3. Put (✓) or (×) in front of the following behaviour to maintain your locomotory system :

a. Giving children polio vaccinations at accurate times. ( )
b. Carrying heavy objects that exceed your ability to strengthen your muscles. ( )
c. Jumping from places that exceeds three meters hight. ( )
d. Eating much sweets as they are rich in calcium and phosphorus. ( )
e. Exposing the body to sunlight for suitable periods. ( )
f. Exercising regularly. ( )





Worksheets

Unit 1 The Lesson

25

Test yourself 1

Answer each of the following questions :

1 Complete the following statements : *(5 marks)*

1. .... is a device that is used to measure the mass of an object, while .... is a device that is used to measure its weight.
2. The gravitational force by which a body is attracted to the Earth is known as .... and it increases by increasing the .... of the body.
3. As the mass of a planet increases, the .... of planet increases and the .... of the object exists on it increases.
4. The measuring units of mass are .... and ...., while the measuring unit of weight is ....
5. The weight of an object on the moon's surface is equal to .... of its weight on the Earth's surface.

---

2 [A] Give reasons for : *(5 marks)*

1. The weight of an object differs according to the planet on which the object exists.
   ....
   ....
2. The balance scale must be placed horizontally on a stable shelf.
   ....
   ....
3. The weight of a person in a balloon differs from its weight on the Earth's surface.
   ....
   ....

[B] Put (✓) or (✗) :

1. The mass of one liter of distilled water equals one kilogram. ( )
2. The mass of an object is measured in Newton that equals 1000 grams. ( )
3. One-arm digital scale is used to measure the weight of objects. ( )
4. The mass of a body changes according to its place. ( )

3 **[A] Complete the following table :** *(5 marks)*

Mass of a body on the Earth's surface	30 kg.	...... kg.	...... gm
Weight of a body on the Earth's surface	.... Newton	10 Newton	30 Newton

[B] Write the scientific term :

1. A device used to measure the mass of small objects as gold and chemicals. (..............................)
2. The measuring unit of mass that equals the mass of one liter of distilled water. (..............................)

4 **[A] What is meant by ... ?** *(5 marks)*

1. Weight :
....
....
2. Mass :
....
....

[B] Choose the correct answer :

1. By increasing the distance between an object and the Earth's surface, so the weight of this object ....
   a. decreases. b. increases. c. is not affected. d. (a) and (b).
2. All the following scales can be used to determine the mass of an object except ....
   a. sensitive balance. b. balance scale.
   c. digital scale. d. spring scale.
3. Weight (Newton) = Mass (kg.) × ....
   a. 1 b. 10 c. 100 d. 1000

1 Part

5 [A] Choose from column (B) what suits it in column (A) : *(5 marks)*

(A)	(B)
1. Gram	a. the measuring unit of weight.
2. Kilogram	b. the measuring unit of big masses.
3. Newton	c. always affects towards the center of Earth.
4. Weight	d. the measuring unit of small masses.

1. .... 2. .... 3. .... 4. ....

[B] If the mass of an object on the Earth's surface equals 60 kg.

Calculate the following :

1. Its mass on the moon's surface.

....

2. Its weight on the Earth's surface.

....

....

3. Its weight on the moon's surface.

....

....

General Exercises of the School Book on Unit 1

1 Choose the correct answer :

1. The device of measuring weight is ....
   a. one-arm scale. b. two-arms scale. c. digital scale. d. spring scale.
2. An object whose weight is 20 Newton on Earth, its mass is equal to ....
   a. 10 kg. b. 2 kg. c. 200 kg. d. 20 kg.

2 Complete the following statements :

1. Mass is measured by ...., whereas weight is measured by ....
2. Mass is the amount of matter that body contains. It does not change according to ....
3. An object's weight depends on .... , ... and ....

3 Fill in the following table :

Points of comparison	Mass	Weight
Definition :	....	....
Unit of measurement :	....	....
Device of measurement :	....	....
Direction :	....	....
Effect of different places :	....	....

4 If an object's mass = 30 kg. on Earth, calculate :

1. Its mass on the moon.
   ....
2. Its weight on the Earth.
   ....
   ....
3. Its weight on the moon.
   ....
   ....



Model Exam 1 on Unit 1



Answer the following questions :

1 Complete the following statements : *(5 marks)*

1. Mass is measured in gram. It is equal to the mass of .... and suitable for measuring .... masses such as ....
2. The mass of any matter is .... value and it is not affected by changing ....
3. .... is the measuring unit of weight which is almost equal to the weight of an object on .... surface whose mass is .... gram.
4. Weight of any object = ... × 10.
5. The weight of any object can be measured by using the ....

2 [A] Choose the correct answer : *(5 marks)*

1. The weight of any object .... when the distance between the body and the center of Earth increases.
   a. decreases b. increases c. doesn't change d. (a) and (b)
2. The object's mass is 2 kg, so its weight on Earth is equal to ....
   a. 2 Newton. b. 20 Newton. c. 200 Newton. d. 0.2 Newton.
3. The weight of a person in a flying balloon is .... that on the Earth's surface.
   a. smaller than b. larger than c. equal to d. (a) and (b)
4. 5000 gram is equal to ....
   a. 50 kg. b. 500 kg. c. 5 kg. d. 0.5 kg.

[B] What is meant by ... ?

1. The weight of a person is equal to 700 Newton.
   ....
2. The mass of one small watermelon is 2 kilogram.
   ....

3 [A] Put (✓) or (✗) : *(5 marks)*

1. Spring scale is used to measure the mass of objects. ( )
2. The weight of an object on the Earth's surface equals 6 times of its weight on the moon's surface. ( )



3. The balance scale is used to measure large weight as cheese and vegetables. ( )
4. Sensitive scale is used to measure small masses as gold and chemicals. ( )

[B] Compare between :

Points of comparison	Mass	Weight
Measuring devices :	....	....
The effect of changing the place :	....	....

4 **[A] Write the scientific term :** *(5 marks)*

1. The measuring unit of mass. (....................)
2. The measuring unit of weight. (....................)

[B] Look at the opposite figure, then answer the questions :

1. What is the name of each figure ?
   fig. (a) .... fig. (b) ....
2. What is the importance of fig : (b) ?
   ....
   ....



Fig. (a) Fig. (b)

5 **[A] Give reasons for :** *(5 marks)*

1. The weight of a person on the Earth's surface is larger than that on the moon's surface.
   ....
2. The mass of a body on the Earth's surface is equal to the mass of the same body on the moon's surface.
   ....

[B] If the weight of an object on the moon's surface equals 8 Newton, calculate :

1. The weight of the object on the Earth's surface.
   ....
2. The mass of the object on the Earth's surface.
   ....

Model Exam 2 on Unit 1



Answer the following questions :

1 Choose the correct answer : (5 marks)

1. .... can be used to determine the mass of an object.
   a. Balance scale b. Sensitive scale c. Digital scale d. (a) , (b) and (c)
2. 1 Newton = ... × 10
   a. 1 kg. b. 0.1 kg. c. 0.1 gm. d. 0.01 kg.
3. The Earth gravitational force .... , as the distance between an object and the center of the Earth increases.
   a. decreases b. increases c. doesn't change d. no correct answer
4. The object's weight on the moon = It weight on the Earth ÷ ....
   a. 6 b. 0.6 c. 16 d. 61
5. If the mass of your body is equal to 36 kg. on the Earth's surface, so your mass on the moon surface is ....
   a. 6 Newton. b. 360 Newton. c. 36 kg. d. 360 kg.

2 [A] Give reasons for the following : (5 marks)

1. The gravitational force of the Earth is more than that of the moon.
   ....
   ....
2. The wire of a spring scale expands when a body is hanged to it.
   ....
   ....

[B] Correct the underlined words :

1. Newton is nearly equal the mass of one paper clip. (.................)
2. The weight of an object doesn't change according to the planet that the object exists on. (.................)
3. The mass of your body on the Earth is more than that on the moon. (.................)
4. The weight of objects is measured in kilogram. (.................)



Test yourself

3 **[A] Write the scientific term :** *(5 marks)*

1. The amount of matter in an object. (..................)
2. The force by which a body is attracted to the Earth. (..................)

[B] Write down the factors that affect the weight of an object :

1. ....
2. ....
3. ....

4 **[A] What happens if ... ?** *(5 marks)*

1. You travel from the Earth's surface to the moon's surface. (according to your weight).
....
....
2. There is no gravity on the Earth's surface.
....
....

[B] Write the name of the device that is used to measure the following :

1. The mass of vegetables and fruits. (..................)
2. The weight of your school bag. (..................)
3. The mass of a golden ring. (..................)

5 **If you know that the weight of an object on the Earth's surface is 480 Newton. Calculate :** *(5 marks)*

1. Its mass on the Earth's surface.
....
2. Its mass on the moon's surface.
....
3. Its weight on the moon's surface.
....
....

Unit 2 Lesson 1

Test yourself 2

25

Answer each of the following questions :

1 Complete the following sentences : (5 marks)

1. Temperature is the degree of ………… or ………… of a body.
2. Wood is ………… conductor of heat, while aluminium is ………… conductor of heat.
3. All ………… such as iron and copper are ………… conductors of heat.
4. Handles of cooking pots are made of heat ………… materials such as plastic and …………
5. Heat is a form of ………… and can be measured by using …………

2 [A] Give reasons for : (5 marks)

1. Copper is considered as a good conductor of heat, while wood is considered as a bad conductor of heat.

……………………………………………………………………

……………………………………………………………………

2. Cooking pots are made of aluminium.

……………………………………………………………………

……………………………………………………………………

3. Wearing heavy woolen clothes in winter.

……………………………………………………………………

……………………………………………………………………

[B] Put (✓) or (✗) , then correct the underlined word :

1. Metals are **equal** in conducting heat. (   )

……………………………………………………………………

2. Heat always transfers from the **cold object to hot object**. (   )

……………………………………………………………………



3 **Compare between :** *(5 marks)*

Points of comparison	Heat conductors	Heat insulators
1. Definition :	....	....
2. Examples :	.... and	.... and ....
3. One use :	....	....

4 **[A] What is meant by ... ?** *(5 marks)*

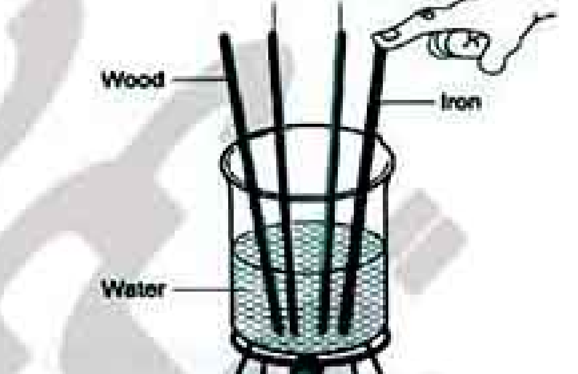
1. Heat energy :
....
....

2. Temperature :
....
....

[B] Write the scientific term :

1. Materials that allow heat to flow through. (....................)
2. The fastest metal in conducting heat. (....................)
3. Materials that don't let heat flow through. (....................)

5 **[A] The opposite figure shows an activity you have studied. Write your observations and conclusion.** *(5 marks)*



- **Observations :**
  1. ....
  2. ....
- **Conclusion :**
....

[B] Classify the following materials into heat conductors and heat insulators :

(Iron - Plastic - Air - Copper - Aluminium - Wood - Stainless steel - Water)

Heat conductors	Heat insulators
....	....



Unit 2 Lesson 2

Test yourself 3

25

Answer each of the following questions :

1 Complete the following sentences : *(5 marks)*

1. The main idea of thermometer is the change in the .... of the liquid inside it according to the change of ....
2. .... is used in measuring the temperature of different liquids, whereas .... is used in measuring the temperature of the human body.
3. In Celsius thermometer, the lower fixed point is .... degree, while the upper fixed point is .... degree.
4. In medical thermometer, each degree is divided into .... parts, where each part equals .... degree.
5. Liquids expand by .... and contract by ....

2 [A] Give reasons for : *(5 marks)*

1. Mercury is used in the manufacture of thermometers.
....
....
....
2. The presence of a constriction in the medical thermometer.
....
....
3. Thermometers must be kept out the reach of children.
....

[B] Put (✓) or (✗) :

1. Mercury is a good conductor of heat. ( )
2. The capillary tube inside the thermometer is closed at one of its ends, while the other end is connected to the mercury bulb. ( )
3. The scale of the medical thermometer starts with 35°C to 42°C. ( )
4. Ethyl alcohol is the liquid that is used in the manufacture of medical thermometer. ( )

3 **[A] What happens if ... ?** *(5 marks)*

1. The medical thermometer is placed in a cup of boiled water.

....

....

2. You seize the medical thermometer firmly with your teeth.

....

....

[B] Choose the correct answer :

1. The .... thermometer contains a constriction.
   a. Celsius b. medical
   c. (a) and (b) d. no correct answer
2. Types of thermometers include ....
   a. medical thermometer. b. Celsius thermometer.
   c. spring scale. d. (a) and (b).
3. Before using the medical thermometer, we must ....
   a. shake it. b. sterilize it.
   c. (a) and (b). d. no correct answer.

4 **Write the scientific term :** *(5 marks)*

1. A device used to measure the temperature. (..................)
2. A small structure in the medical thermometer that prevents mercury to return back to the mercury bulb. (..................)
3. A liquid that is used in sterilizing the medical thermometer. (..................)
4. A device that is used to measure the temperature of iced water. (..................)
5. The boiling point of water. (..................)

5 **Look at the following figures , then answer the following questions :** *(5 marks)*

1. Label the figures :
   ① .... ② ....
   ③ .... ④ ....
2. Figure (a) represents the .... which is used to measure ....
3. Figure (b) represents the .... which is used to measure ....
4. What is the importance of part number ① ?

....

fig. (a) fig. (b)



General Exercises of the School Book on Unit 2

1 Complete the following statements :

1. We measure temperature by using ....
2. .... is used in measuring temperatures of different liquids, whereas .... is used in measuring the temperature of the human body.
3. .... , ... and .... are good conductors of heat.
4. .... , ... and .... are bad conductors of heat.

2 Write the scientific term for each of the following statements :

1. A device used to measure temperature. (...............)
2. The materials that allow the flow of heat inside. (...............)
3. The materials that do not allow the flow of heat inside. (...............)

3 Write the most important uses of the good and bad conductors of heat.

....

....

....

....

4 Fill in the spaces of the following tables :

1.

Points of comparison	Celsius thermometer	Medical thermometer
Structure :	....	
Scale :	....	....
Used liquid :	....	....
Usage :	....	....

2.

Points of comparison	Good conductors of heat	Bad conductors of heat
Definition :	....	....
Examples :	....	....
Usage :	....	....

5 **Put (✓) in front of the correct statements and (✗) in front of the false one and correct the false ones :**

1. Medical thermometer is used in measuring the temperatures of different liquids. ( )
   ....
2. The scale of the Celsius thermometer starts from 35°C to 42°C ( )
   ....
3. Aluminium is a bad conductor of heat. ( )
   ....
4. Wood is a good conductor of heat. ( )
   ....

6 **Write an explanation for each of the following :**

1. Mercury is used in thermometers.
   ....
   ....
   ....
2. The handles of cooking utensils are made of wood or plastics.
   ....
3. Cooking utensils are made of stainless steel or aluminium.
   ....
4. There is a constriction in the medical thermometer.
   ....
   ....

Model Exam 1 on Unit 2



Answer the following questions :

1 Complete the following statements : *(5 marks)*

1. Leaving spaces between railway bars which are made of .... to avoid train accident as .... is considered .... heat conductor.
2. Handles of cooking pots and electric iron are made of .... or ....
3. .... conducts heat faster than aluminium and iron.
4. The main idea of thermometer action is changing the .... of liquid inside as the .... changes.
5. Mercury is used in making thermometers because it is a .... metal and .... conductor of heat.

2 [A] Give reasons for : *(5 marks)*

1. All metals are good conductors of heat.
   ....
2. Mercury is used in the manufacture of thermometer.
   ....
   ....
3. The presence of a constriction in the medical thermometer.
   ....

[B] Put (✓) or (✗) :

1. Aluminium conducts heat slower than copper. ( )
2. Different metals transfer heat by the same rate. ( )

3 [A] Choose the correct answer : *(5 marks)*

1. Heat transfers from ....
   a. a glass of hot tea to a glass of ice.
   b. a glass of ice to a glass of hot tea.
   c. a glass of hot tea to another glass of tea that has the same temperature.
   d. all the previous answers.
2. Aluminium conducts heat faster than ....
   a. copper. b. iron. c. (a) and (b) d. no correct answer.
3. The normal temperature of the healthy person is ....
   a. 36.4°C b. 38°C c. 37°C d. 40°C



4. The medical thermometer is placed .... tongue to measure temperature.
   a. above b. under c. beside d. (a) and (b)
5. The scale of Celsius thermometer ranges between ....
   a. zero°C to 10°C b. zero°C to 100°C
   c. zero°C to 50°C d. 37°C to 42°C

[B] Look at the opposite figures and then answer the questions :

1. What is the name of fig. (a) and fig. (b) ?
   ....
   ....
2. What are the uses of fig. (a) and (b) ?
   ....
   ....
   ....
   ....

fig. (a) fig. (b)

4 [A] Give the scientific term : *(5 marks)*

1. A liquid metal that is used in making thermometer. (....................)
2. A type of thermometers that its scale ranges from 0°C to 100°C. (....................)
3. A material that is used in making heavy blankets. (....................)

[B] What is meant by ... ?

1. Heat conductors.
   ....
2. Heat energy.
   ....

5 [A] What happens if ... ? *(5 marks)*

1. The handles of cooking pots are made of aluminium.
   ....
2. There is no constriction in the medical thermometer.
   ....
3. A medical thermometer is put in boiled water.
   ....

[B] What is the main idea of making thermometers ?
....



Model Exam 2 on Unit 2



Answer the following questions :

1 Choose the correct answer : (5 marks)

1. .... is the liquid that is used in making thermometers.
   a. Water b. Mercury c. Alcohol d. Oil
2. .... conduct(s) heat faster than iron.
   a. Copper b. Aluminium c. Wood d. (a) and (b)
3. All the following are heat insulators except ....
   a. air. b. wool. c. stainless steel. d. plastic.
4. .... is used to sterilize the medical thermometer before using.
   a. Mercury b. Ethyl alcohol c. Boiled water d. Cold water
5. You feel hot when you touch a cup of tea, because the temperature of the cup is .... that of your hand.
   a. more than b. less than c. equal to d. (a), (b) and (c)

2 [A] Give reasons for the following : (5 marks)

1. Medical thermometer must be shaked before using.
   ....
2. You feel cold when touching a piece of ice.
   ....
   ....
3. Boiling water is not used to sterilize the medical thermometer.
   ....
   ....

[B] Put (✓) or (✗)

1. The volume of liquids change by changing the temperature. ( )
2. Handles of cooking pots are made of heat conducting materials. ( )
3. Air is used in making the insulating glass windows. ( )
4. Mercury is a regular expanding material. ( )

3 Complete the following sentences : (5 marks)

1. The degree of .... or .... of an object is known as temperature.



2. The melting point of ice is .... °C, while the boiling point of water is .... °C
3. Cooking utensils are made up of .... or ....
4. In the .... thermometer, there is a .... above the mercury bulb.
5. Mercury remains in liquid state between .... °C and .... °C

4 **[A] What happens if ... ?** *(5 marks)*

1. Two bodies have the same temperature touch each other.

....

....

2. The medical thermometer doesn't have a constriction.

....

....

[B] Choose from column (B) what suits it in column (A) :

(A)	(B)
1. Celsius thermometer.	a. Its scale is from 35°C to 42°C.
2. Heat energy.	b. is 37°C.
3. Medical thermometer.	c. transfers from hot body to cold body.
4. The normal human body temperature.	d. Its scale is from 0°C to 100°C.

1. .... 2. .... 3. .... 4. ....

5 **[A] Write one function of each of the following :** *(5 marks)*

1. Wood and plastic :

....

2. Medical thermometer :

....

3. Celsius thermometer :

....

[B] Why mercury is used in making thermometers. (2 points only)

1. ....
2. ....



Unit 3 Lesson 1

25

Test yourself 4

Answer each of the following questions :

1 Write the scientific term : *(5 marks)*

1. A mixture of gases surrounding the Earth. (..............................)
2. The chemical substance that acts as a catalyst in the preparation of oxygen gas in laboratory. (..............................)
3. The way that is used to collect oxygen gas in laboratory. (..............................)
4. The process by which plants take carbon dioxide gas and produce oxygen gas. (..............................)
5. A chemical substance that remains without any change during the chemical reaction. (..............................)

2 Complete the following statements : *(5 marks)*

1. .... gas and other gases represent 1 % of the air volume, while .... gas represents 78 %
2. .... gas is consumed in respiration and .... processes.
3. .... gas is prepared in laboratory by the decomposition of .... in the presence of manganese dioxide.
4. In photosynthesis process, the plant takes ...., water, sunlight and mineral salts to produce .... and ....
5. Oxygen represents .... of the air volume.

3 Ramy makes this activity to know the percentage of oxygen gas in air. *(5 marks)*

Graduated cylinder

1. Ramy notice from this activity that water rises up in the cylinder with .... of its volume.
2. What does he conclude from this activity ?
....
3. Why does the water level rise up to this level ?
....



4 **[A] Give reasons for :** *(5 marks)*

1. Oxygen is collected by downward displacement of water.

....

2. Smoke and dust particles are air pollutants, but they are important in formation of snow and rains.

....

3. Manganese dioxide is considered as a catalyst during the preparation of oxygen.

....

[B] 1. Look at the opposite figure, then answer :

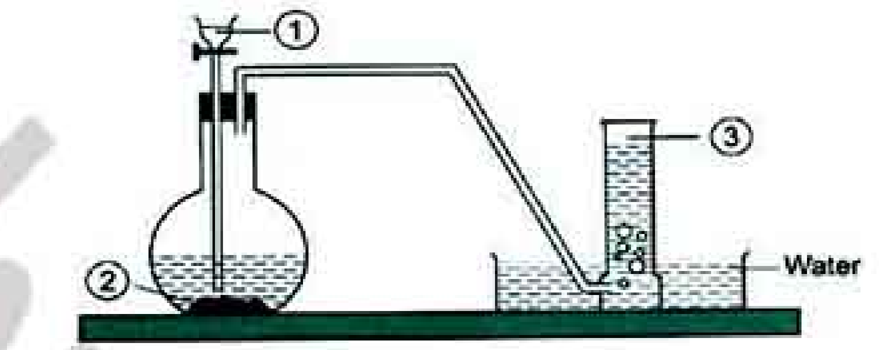
The opposite apparatus is used in preparation of ....

2. Label the figure :

① ....

② ....

③ ....



5 **[A] Choose the correct answer :** *(5 marks)*

1. All the following statements concerning the atmosphere except ....
   a. it adjusts the temperature of the Earth's surface.
   b. it consists of oxygen and nitrogen only.
   c. it protects the Earth from ultraviolet radiation coming from outer space.
   d. it is attracted to the Earth by gravity.
2. The percentage of oxygen gas equals .... of the air volume.
   a. $\frac{1}{2}$ b. $\frac{1}{5}$ c. $\frac{1}{4}$ d. $\frac{1}{8}$
3. Oxygen is prepared by the decomposition of ....
   a. hydrogen. b. nitrogen oxide.
   c. hydrogen peroxide. d. calcium carbonate.

[B] What happens if ... ?

- The percentage of oxygen gas in air increases more than 21%

....

....



Unit 3 Lesson 1

25

Test yourself 5

Answer each of the following questions :

1 Put (✓) or (✗) , then correct the wrong ones : *(5 marks)*

1. Air is heavier than oxygen, so it replaces oxygen. ( )
   ....
2. The combination between oxygen and an element in the presence of water is oxidation process. ( )
   ....
3. Oxygen gas doesn't burn and doesn't help in burning. ( )
   ....
4. The mass of elements decreases after combination with oxygen. ( )
   ....
5. Oxygen gas is compressed in cylinders to be used during diving and climbing mountains. ( )
   ....

2 Complete the following statements : *(5 marks)*

1. The rapid combination between oxygen and an element is ...., while .... is the slow combination between oxygen and an element.
2. Oxy-acetylene flame is used in .... and .... of metals.
3. Oxygen gas .... dissolves in water, so it is prepared in laboratory by ....
4. Oxygen combines with (lighted) magnesium to form .... which is white matter.
5. Ozone molecule is composed of .... atoms, but oxygen molecule is composed of .... atoms.
6. To avoid ...., we must isolate ironware by paints.

3 [A] Mention three properties of oxygen gas. *(5 marks)*

....
....
....

[B] What happens when ... ?

1. Leaving iron cubes in moist air without painting for a long time.

....

2. A burning fragment is inserted in a cylinder filled with oxygen.

....

4 [A] Write the scientific term : *(5 marks)*

1. It is a slow combination between oxygen and an element in the presence of water. (................................)
2. A layer in the atmosphere that protects the Earth from harmful radiations coming from the Sun. (................................)
3. A substance that is composed of oxygen combines with hydrogen. (................................)

[B] Mention two uses of oxygen gas.

....

....

5 [A] Choose the correct answer : *(5 marks)*

1. Oxygen cylinders are used ....
   a. in mechanical ventilation. b. during diving.
   c. to protect the Earth from harmful radiation.
   d. (a) and (b).
2. Oxy-acetylene flame is obtained as a result of combination between ....
   a. oxygen with hydrogen. b. acetylene with hydrogen.
   c. acetylene and nitrogen. d. acetylene with oxygen.
3. Water molecule consists of ....
   a. one oxygen atom and one hydrogen atom.
   b. one hydrogen atom and two oxygen atoms.
   c. two oxygen atoms and two hydrogen atoms.
   d. one oxygen atom and two hydrogen atoms.

[B] Give reasons for :

1. Iron rusting has many problems.

....

2. Climbers use oxygen cylinders during climbing mountains.

....

Unit 3 Lesson 2



Test yourself 6

Answer each of the following questions :

1 Choose the correct answer : *(5 marks)*

1. All the following processes produce carbon dioxide gas except ....
   a. respiration process.
   b. combustion of coal.
   c. combustion of tobacco.
   d. photosynthesis process.
2. Carbon dioxide gas is produced from ....
   a. respiration of animals only.
   b. respiration of plants only.
   c. respiration of humans only.
   d. (a) , (b) and (c)
3. Carbon dioxide molecule consists of one carbon atom linked with ....
   a. one oxygen atom.
   b. two oxygen atoms.
   c. two nitrogen atoms.
   d. one hydrogen atom.
4. Preparation of carbon dioxide occurs by ....
   a. adding dilute hydrochloric acid to calcium oxide.
   b. adding dilute hydrochloric acid to calcium carbonate.
   c. adding hydrogen peroxide to manganese dioxide.
   d. (b) and (c).
5. Limewater is used to detect the presence of carbon dioxide gas in air due to formation of .... which is insoluble in water.
   a. calcium carbonate
   b. calcium oxide
   c. nitrogen gas
   d. sodium hydroxide

2 [A] Give reason for each of the following : *(5 marks)*

1. Increasing the percentage of carbon dioxide gas in air.
   ....
   ....
2. Carbon dioxide gas is not collected by displacement of water.
   ....
3. Limewater is used to detect the presence of carbon dioxide gas.
   ....







[B] Look at the opposite figure , then answer :

1. What happens for clear limewater in the jar ?

....

....

2. This activity proves that ....

....

Jar cover
Germinated bean seeds
Clear limewater

3 Complete the following statements : *(5 marks)*

1. By adding .... to .... we can prepare carbon dioxide gas.
2. Carbon dioxide is prepared by .... displacement of air as it is .... than air.
3. .... and .... are from the factors that increase the percentage of carbon dioxide gas.
4. Carbon dioxide molecule consists of .... linked with two ....
5. Carbon dioxide is used in .... process and produced from .... process.

4 Look at the opposite figure , then answer : *(5 marks)*

1. This apparatus is used in preparation of ....
2. By adding liquid ⓐ to substance ⓑ , ... evolves.
3. Label the figure :

ⓐ ....

ⓑ ....

ⓒ ....

ⓐ
Tap
ⓒ
ⓑ
Cylinder

5 [A] Compare between oxygen gas and carbon dioxide gas according to preparation. *(5 marks)*

....

....

....

[B] Put (✓) or (✗) and correct the wrong ones :

1. Decreasing the green areas causes increasing the ratio of carbon dioxide gas in air. (   )

....

2. Carbon dioxide is necessary for humans to build their bodies. (   )

....



Unit 3 Lesson 2

25

Test yourself 7

Answer each of the following questions :

1 [A] Give reasons for : *(5 marks)*

1. Adding yeast to dough.

....

2. Carbon dioxide gas has many uses.

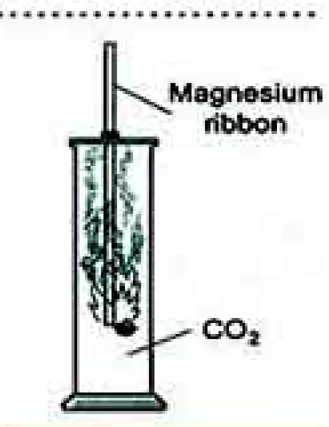
....

....

3. Carbon dioxide gas is used in extinguishing fires.

....

[B] Look at the opposite activity, then answer :



The combustion of magnesium ribbon in this activity produces .... which is white powder and .... which is a black substance.

2 [A] Choose the correct answer : *(5 marks)*

1. All the following are from the properties of carbon dioxide gas except ....
   a. it is heavier than air.
   b. it doesn't burn and doesn't help in burning.
   c. it easily dissolves in water.
   d. it scarcely soluble in water.
2. Which of the following is from the importance of carbon dioxide gas ? ....
   a. It is used in cutting and welding metals.
   b. It is used in diving.
   c. It is used in making soft drinks.
   d. It is used during climbing mountains.
3. When a glowing magnesium ribbon is inserted in a jar containing carbon dioxide gas , ... element deposits on the wall of the jar.
   a. carbon b. magnesium c. sodium d. chlorine

[B] What are the disadvantages of increasing carbon dioxide gas in air ?

1. ....
2. ....

3 Complete the following sentences : *(5 marks)*

1. Adding yeast to dough produces ………… gas during ………… process that expands by heat making bread porous and tasty.
2. Carbon dioxide gas is converted into ………… by pressure and cooling, but by relieving pressure, ………… is produced.
3. Increasing the percentage of carbon dioxide gas causes ………… and also ………… phenomenon.
4. Carbon dioxide is necessary for plants to make ………… process and necessary for baker in making …………

4 [A] What happens when ... ? *(5 marks)*

1. Squeezing half a lemon on a beaker contains a little amount of sodium carbonate.
…………………………………………………………………………
2. Inserting a lighted magnesium ribbon in a cylinder filled with CO_2
…………………………………………………………………………
3. The percentage of carbon dioxide gas in air decreases.
…………………………………………………………………………

[B] Mention two properties for carbon dioxide gas.

…………………………………………………………………………

…………………………………………………………………………

5 Put (✓) in front of the correct statements and (✗) in front of the incorrect ones, then correct it : *(5 marks)*

1. Carbon dioxide is used in extinguishing fires. ( )
…………………………………………………………………………
2. The black substance that deposits on the wall of the cylinder due to the reaction between carbon dioxide and magnesium ribbon is magnesium oxide. ( )
…………………………………………………………………………
3. Global warming is a phenomenon that occurs due to increasing the percentage of oxygen gas in air. ( )
…………………………………………………………………………
4. Carbon dioxide gas helps in burning. ( )
…………………………………………………………………………
5. Carbon dioxide gas is used in making dry ice and soft drinks. ( )
…………………………………………………………………………



Unit 3 Lessons 1 & 2



Test yourself 8

Answer the following questions :

1 Choose the correct answer : *(5 marks)*

1. Ozone molecule consists of .... atoms linked together.
   a. three hydrogen b. three oxygen
   c. two oxygen d. two hydrogen and one oxygen
2. Clear limewater is a solution of ....
   a. calcium carbonate. b. sodium carbonate.
   c. sodium hydroxide. d. calcium hydroxide.
3. Carbon dioxide is used in making ....
   a. soft drinks. b. dry ice. c. bread. d. (a) , (b) and (c).
4. Adding lemon juice onto .... produce carbon dioxide.
   a. sodium chloride b. sodium bicarbonate
   c. calcium chloride d. (a) , (b) and (c)
5. Which of the following is heavier than air ? ....
   a. Oxygen gas. b. Carbon dioxide gas.
   c. (a) and (b). d. No correct answer.

2 [A] Give reasons for the following : *(5 marks)*

1. Oxygen gas is collected by downward displacement of water, while carbon dioxide gas is not collected by this method.
   ....
   ....
2. Drinking big quantities of soft drinks has many bad effects on the human health.
   ....
   ....
3. Oxygen gas is not used in putting off fires.
   ....

[B] Name the gas that leads to :

1. Corrosion and damage of ironware. (..................)
2. Suffocation of living organisms. (..................)



3 **Complete the following sentences :** *(5 marks)*

1. In the atmospheric air, oxygen gas represents .... % , while carbon dioxide gas represents .... %
2. The solid chemical substance used during preparation of oxygen is ...., while the solid chemical substance used during preparation of carbon dioxide is ....
3. Green plants use .... gas during their respiration, while they produce .... gas during photosynthesis.
4. The temperature of .... flame rises to 3500°C, so it is used in ....
5. When a lighted magnesium ribbon is placed in a jar filled with .... gas, a white powder and a .... substance are produced.

4 **[A] What happens if ... ?** *(5 marks)*

1. Ironware are not painted.
....
....
2. Calcium carbonate reacts with dilute hydrochloric acid.
....
....
3. Yeast is added to dough during making bread.
....
....

[B] Put (✓) or (✗) :

1. Oxygen and carbon dioxide scarcely dissolve in water. (   )
2. Exhaled air contains a big amount of oxygen gas. (   )
3. Limewater is used to detect oxygen gas. (   )
4. Carbon dioxide gas doesn't burn and doesn't help in burning. (   )

5 **[A] Compare between :** *(5 marks)*

Point of comparison	Oxidation	Combustion
Definition :	....	....

[B] Mention one use of each of the following :

1. Oxygen gas : ....
2. Carbon dioxide gas : ....



Unit 3 Lesson 3

25

Test yourself 9

Answer each of the following questions :

1 Complete the following sentences : *(5 marks)*

1. During preparation of nitrogen gas, we use ………… to remove oxygen from air and use potassium hydroxide to remove ………… from air.
2. ………… exists in protein substances.
3. The roots of legumes contain ………… that helps these plants to produce ………… from atmospheric nitrogen.
4. The percentage of nitrogen gas in air is ………… , while the percentage of oxygen represents …………
5. ………… gas and ………… gas are collected by downward displacement of water.
6. ………… gas that represents 78 % of the air volume is scarcely soluble in water.

2 Put (✓) or (✗) , then correct : *(5 marks)*

1. Nitrogen molecule consists of one nitrogen atom. (   )
…………………………………………………………………
2. Nitrogen is very important gas as it forms protein substance. (   )
…………………………………………………………………
3. Concentrated sodium hydroxide is used to absorb oxygen gas from air. (   )
…………………………………………………………………
4. Oxygen reacts with nitrogen during lightning forming nitrogen oxide. (   )
…………………………………………………………………
5. Nitrogen gas is collected by upward displacement of air. (   )
…………………………………………………………………

3 Give reasons for : *(5 marks)*

1. During preparation of nitrogen, we pass air over hot copper.
…………………………………………………………………
2. Nitrogen is called lifeless gas.
…………………………………………………………………
…………………………………………………………………



3. Legumes are rich in protein substances.

....

....

4 **Look at the opposite apparatus, then answer :** *(5 marks)*

1. Passing air over solution ⓐ to

....

2. Passing air through tube ⓑ to

....

3. The gas that is collected in the cylinder is ....

4. Write the labels :

ⓐ ....

ⓑ ....

ⓒ ....

5. What happens if the flask that contains solution ⓐ is removed from the apparatus ?

....

5 **Compare between nitrogen gas and oxygen gas according to the percentage in air and preparation :** *(5 marks)*

....

....

....

....

....

....

Unit 3 Lesson 3

Test yourself 10

25

Answer each of the following questions :

1 Complete the following sentences : *(5 marks)*

1. Nitrogen is used in filling .... and some types of ....
2. Liquefied nitrogen is used in .... and ....
3. .... gas (that represents 78 % of air volume) scarcely dissolves in water, while .... gas easily dissolves in water.
4. Nitrogen gas is used in making .... , ... and ....

2 Choose the correct answer : *(5 marks)*

1. All the following are from the properties of nitrogen gas except ....
   a. it is easily soluble in water. b. it doesn't help in burning.
   c. it is colourless, tasteless and odorless.
   d. it can be condensed into a liquefied state.
2. All the following are from the importance of nitrogen gas except ....
   a. it is important for respiration process.
   b. it is used in manufacturing of soil fertilizers.
   c. it is used in treatment of skin tumors.
   d. it is used in making gunpowder.
3. .... gas has a pungent smell.
   a. Ammonia b. Carbon dioxide c. Oxygen d. Nitrogen
4. Nitrogen is used in ....
   a. manufacturing of electronic devices.
   b. filling some types of lamps.
   c. storing petroleum.
   d. (a) , (b) and (c)
5. Recently, car tires are filled with .... gas.
   a. oxygen b. nitrogen c. carbon dioxide d. carbon



3 [A] Give reasons for : *(5 marks)*

1. Nitrogen gas doesn't easily react with a lot of elements.

....

2. On putting a lighted fragment (match) in a cylinder filled with nitrogen, the fragment is put off.

....

[B] Mention three properties of nitrogen gas.

....

....

4 Compare between oxygen gas, nitrogen gas and carbon dioxide gas according to their properties and uses : *(5 marks)*

(1 point only in each item)

....

....

....

....

....

....

5 The two pictures represent steps in an activity : *(5 marks)*

1. Arrange the pictures to show the steps of the activity.

....

....

2. By adding water to the white substance, ... smell of .... gas evolves.

3. We conclude from this activity that :

....

....

Water
White substance
fig. (a)

Magnesium ribbon
CO_2
Nitrogen gas
White substance
fig. (b)

General Exercises of the School Book on Unit 3

1 Put (✓) in front of the correct statements and (✗) in front of the false ones and correct the false ones :

1. The nodular bacteria fix oxygen of air in the roots of leguminous plants such as beans and clover. ( )

....

....

2. Oxygen gas occupies 78% of the atmospheric air components. ( )

....

2 Justify (Give reasons for the following) :

1. Nitrogen is used to store petroleum and some flammable materials.

....

2. The clear limewater is used in detection of carbon dioxide gas.

....

3 Explain how you get :

1. Oxygen gas from hydrogen peroxide.

....

....

2. Carbon dioxide gas from wood.

....

4 Look at the opposite figure, then answer :

1. Write what represents each label on figure :
   - Substance (a) : ....
   - Liquid (b) : ....
2. Mention the uses of carbon dioxide gas :
   1. ....
   2. ....
   3. ....



Model Exam 1 on Unit 3



Answer the following questions :

1 **Complete the following statements :** *(5 marks)*

1. Oxygen is produced from .... process, and it represents .... % of the volume of the atmospheric air.
2. Nitrogen is used in the manufacture of .... which doesn't rust.
3. Oxygen combines with acetylene gas to produce ....
4. When nitrogen reacts with a burning magnesium ribbon, ... is formed which dissolves in water to produce .... gas.
5. During preparation of oxygen, hydrogen peroxide is dissociated into .... and ....
6. Carbon dioxide is produced during .... and .... processes.

2 **[A] Give reasons for :** *(5 marks)*

1. The percentage of oxygen remains constant in the atmosphere.

....

....

2. Nitrogen is recently used in filling car tires.

....

[B] Put (✓) or (✗) :

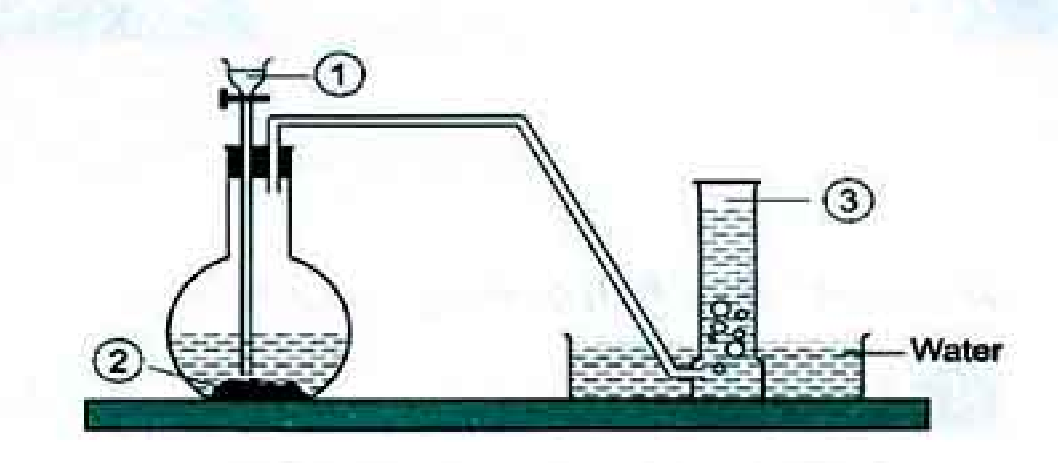
1. Carbon dioxide gas doesn't burn and doesn't help in burning. (   )
2. Nitrogen is called azote which means gas of life. (   )
3. Oxygen gas occupies about one fifth of the air volume. (   )
4. Limewater is used to detect the presence of nitrogen gas. (   )

3 **[A] Write the scientific term :** *(5 marks)*

1. A gas that composes protein substance that builds up our bodies. (....................)
2. A gas that its molecule is composed of three oxygen atoms. (....................)
3. The method that is used to collect carbon dioxide gas during its preparation. (....................)

1 Part

[B] The shown apparatus represents the preparation of oxygen gas in the laboratory :



1. Label the figure :
   ① ....
   ② ....
   ③ ....
2. Oxygen gas is collected by downward displacement of water, Why ?
   ....

4 Choose the correct answer : *(5 marks)*

1. Nitrogen gas is used in the manufacture of ....
   a. fire extinguishers. b. soil fertilizers. c. soft drinks. d. dry ice.
2. A gas which turns limewater into turbid is .... gas.
   a. oxygen b. nitrogen c. ozone d. carbon dioxide
3. .... are from the air pollutants.
   a. Dust particles b. Smoke
   c. Gases produced by factories d. (a) , (b) and (c)
4. The rapid combination between oxygen and elements producing heat and light is called ....
   a. oxidation. b. burning. c. respiration. d. reduction.
5. Which of the following is from the uses of carbon dioxide gas ? ....
   a. Formation of ozone layer. b. Making dry ice.
   c. Cutting and welding of metals. d. Mechanical ventilation.

5 [A] What happens when ... ? *(5 marks)*

1. Ozone layer is decayed.
   ....
2. Drinking big quantities of soft drinks.
   ....

[B] Correct the underlined words :

1. Water is composed of oxygen and **nitrogen**. (..................)
2. **Solid** nitrogen is used to treat the skin tumors. (..................)
3. **Oxygen** gas is emitted as a result of the combustion of organic materials. (..................)



Model Exam 2 on Unit 3



Answer the following questions :

1 Complete the following sentences : *(5 marks)*

1. Rusting of iron is due to the presence of water and .... gas, whereas .... gas is used in making stainless steel which doesn't rust.
2. Nitrogen gas reacts with .... during lightning forming ....
3. Both .... gas and .... gas are scarcely dissolve in water.
4. During preparation of nitrogen, sodium hydroxide is used to remove ...., while hot copper is used to remove .... from the atmospheric air.
5. Among the gases that don't help in burning, ... gas and .... gas.

2 [A] Give reasons for the following : *(5 marks)*

1. The mass of a cleansing wire increases after burning.
....
....
2. A pungent odour is evolved as a result of addition of water to the product of burning magnesium in nitrogen.
....
....
3. Although carbon dioxide has the smallest percentage in the air, but it is very important in life continuity on the Earth.
....
....

[B] Correct the following sentences :

1. Oxygen and carbon dioxide gases represent most of the atmospheric air.
....
2. Carbon dioxide gas is lighter than the air.
....

3 Write the scientific term : *(5 marks)*

1. A molecule which is formed of two hydrogen atoms combine with one oxygen atom. (..................)



2. A flame which is used in welding and cutting metals. (..................)
3. A phenomenon that occurs due to increasing of the percentage of carbon dioxide gas in atmospheric air. (..................)
4. A gas used in the storage of flammable substances. (..................)
5. A kind of plants such as clover, peas and soybeans. (..................)

4 **[A] What happens when ... ?**

1. The nodular bacteria are not found in the soil.

....

....

2. Carbon dioxide gas reacts with calcium hydroxide dissolved in water.

....

....

[B] Name the gas that :

1. Its molecule is composed of one carbon atom and two oxygen atoms. (..................)
2. Forms the protein substance. (..................)
3. Is used for patients who suffer from breathing difficulties. (..................)

5 **Complete the following table :** *(5 marks)*

Points of comparison	Nitrogen gas	Carbon dioxide gas	Oxygen gas
1. Its ratio in the atmosphere :	....	....	....
2. Its reaction with lighted magnesium ribbon :	.... substance is produced that reacts with water to form .... gas.	They produce .... powder and .... substance deposits on the wall of the cylinder.	.... substance is produced which is known as ....



Unit 4 Lesson 1



Test yourself 11

Answer each of the following questions :

1 Complete the following sentences : *(5 marks)*

1. The human nervous system consists of two main systems which are .... and ....
2. The axon of neuron is covered with .... layer called .... sheath.
3. The outer surface of the two hemispheres is a .... matter called ....
4. The brain is composed of .... , ... and ....
5. The central nervous system is composed of .... and spinal cord.

2 [A] Give reasons for : *(5 marks)*

1. The presence of the brain inside the skull.
....
2. Damage of medulla oblongata leads to death.
....
3. Dentrites extend from the neuron's body.
....

[B] Put (✓) or (✗) :

1. Medulla oblongata lies at the back area of the brain below the two cerebral hemispheres. (   )
2. Cerebellum controls the voluntary movements in the human body. (   )
3. The cell body of neuron contains of nucleus, cytoplasm and plasma membrane. (   )
4. In the cerebral hemispheres, the gray matter is surrounded by the white matter. (   )

3 [A] Write one function for each of the following : *(5 marks)*

1. The two cerebral hemispheres :
....
2. Cerebellum :
....
3. Medulla oblongata :
....

1 Part

[B] Write the scientific term :

1. The building unit of the nervous system. (....................)
2. It is a nerve block containing millions of neurons. (....................)
3. The largest part of the brain. (....................)
4. A cylindrical axis covered with a fatty layer called myelin sheath. (....................)

4 [A] Locate each of the following parts in the human body : *(5 marks)*

1. The cerebellum :
....
2. The cerebral cortex :
....
3. The medulla oblongata :
....
4. The brain :
....

[B] Choose the correct answer :

1. .... connects the brain with the spinal cord.
   a. Cerebellum b. Cerebrum
   c. Medulla oblongata d. Axon
2. The .... system interprets the external stimuli and makes the body respond to them.
   a. respiratory b. digestive c. circulatory d. nervous

5 Look at the following figure, then answer : *(5 marks)*

1. Label the figure :
   ① ....
   ② ....
   ③ ....
   ④ ....
   ⑤ ....
   ⑥ ....

2. This figure shows the structure of .... cell which is the basic structure unit of .... system.
3. What is the function of part number ① ?
....

Unit 4 Lesson 1

25

Test yourself 12

Answer each of the following questions :

1 Choose the correct answer : *(5 marks)*

1. ………… is (are) from the reflex action(s).
   a. Heartbeats
   b. Trying balance during sliding down
   c. Secreting saliva when smelling good food
   d. (b) and (c)
2. The gray matter in the spinal cord appears in the shape of letter …………
   a. H b. Y c. F d. A
3. ………… is responsible for delivering the nerve messages from the body organs to the brain and vice versa.
   a. Cerebellum b. Cerebrum c. Skull d. Spinal cord
4. The centers of the five senses locate in the …………
   a. two cerebral hemispheres. b. spinal cord.
   c. medulla oblongata. d. cerebellum.
5. Peripheral nervous system consists of ………… pairs of nerves.
   a. 31 b. 21 c. 12 d. 43

2 [A] What happens when ... ? *(5 marks)*

1. Drinking a lot of tea and coffee every day.
…………………………………………………………………………
…………………………………………………………………………
2. Your finger gets pricked by the plant thorns.
…………………………………………………………………………
…………………………………………………………………………

[B] Complete the following sentences :

1. The peripheral nervous system consists of ………… pairs of cranial nerves and ………… pairs of spinal nerves.
2. ………… and ………… are from the bad effects caused as a result of addiction.
3. In the spinal cord, the ………… matter is surrounded by the ………… matter.

3 [A] Write one function for each of the following : *(5 marks)*

1. Spinal cord :

....

2. Peripheral nervous system :

....

....

[B] Put (✓) or (✗) :

1. There are 10 pairs of nerves come out of the brain known as the cranial nerves. ( )
2. The spinal cord is responsible for the reflex actions in the human body. ( )
3. To keep your nervous system healthy, you should increase the intake of stimulants. ( )

4 [A] Give reasons for : *(5 marks)*

1. The spinal cord is surrounded by the vertebrae of the backbone.

....

2. The withdrawal of the hand quickly when it suddenly touches a hot surface.

....

[B] Complete the following diagram :

The nervous system consists of
- 1. ....
  - consists of
    - 2. ....
      - consists of
        - 5. ....
        - Cerebellum
        - 6. ....
    - Spinal cord
- Peripheral nervous system
  - consists of
    - 3. ....
    - 4. ....

5 **[A] Write the scientific term :** *(5 marks)*

1. Spontaneous response from the body to different stimuli.

   (..............................)

2. The organ that is responsible for the reflex actions in the human body.

   (..............................)

3. A group of nerves which emerge from the central nervous system.

   (..............................)

[B] Look at the following figure, then complete :

1. This figure represents the structure of ....
2. Label the figure :

   ⓐ ....

   ⓑ ....

[C] How to maintain the human nervous system ?
(two points only)

1. ....
   ....
2. ....
   ....



Unit 4 Lesson 2

Test yourself 13

25

Answer each of the following questions :

1 Complete the following sentences : *(5 marks)*

1. The axial skeleton consists of ………… , ………… and …………
2. Knee joint is from ………… joints, while hip joint is from ………… joints.
3. The backbone is related to the ………… skeleton, while humerus is related to ………… skeleton.
4. The ribcage consists of ………… pairs of ribs.
5. The human locomotory system consists of ………… and …………

2 [A] *Give reasons for :* *(5 marks)*

1. The presence of cartilages between vertebrae of the backbone.

……………………………………………………………………………………

2. You must eat healthy food, that rich in calcium.

……………………………………………………………………………………

3. The ribcage surrounds the heart and lungs.

……………………………………………………………………………………

[B] Put (✓) or (✗) :

1. Wrist joint is from freely movable joints. (   )
2. Cartilages connect bones with muscles. (   )
3. The backbone is composed of 31 vertebrae. (   )
4. The first 10 pairs of ribs are connected to the sternum. (   )

3 [A] Write one function for each of the following : *(5 marks)*

1. The skull :

……………………………………………………………………………………

2. The vertebral column :

……………………………………………………………………………………

3. The upper limbs :

……………………………………………………………………………………

[B] Match :

(A)	(B)
1. Tendons	a. the area of two bones meeting.
2. Joints	b. long strips that fix muscles with bones.
3. Slightly movable joints	c. allow movement in all directions.
4. Freely movable joints	d. allow movement in one direction only.

1. .... 2. .... 3. .... 4. ....

4 [A] Compare between : *(5 marks)*

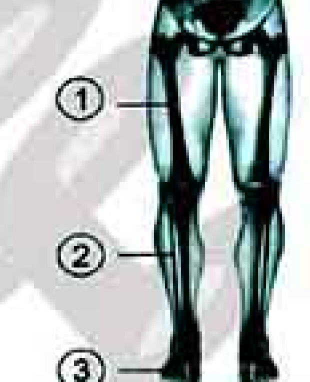
Points of comparison	Voluntary muscles	Involuntary muscles
1. Definition :	....	....
2. Example :	....	....

[B] Cross out the odd word :

1. Skull – backbone – femur – ribcage. (..............................)
2. Humerus – hand bones – forearm bones – vertebral column. (..............................)
3. Shoulder joint – knee joint – wrist joint – thigh joint. (..............................)
4. Ribcage – femur – shaft bones – foot bones. (..............................)

5 [A] Examine the opposite figure, then answer : *(5 marks)*

1. The figure represents the ....
2. Label the figure :
   ① ....
   ② ....
   ③ ....



[B] Mention three ways to maintain your locomotory system :

1. ....
2. ....
3. ....

General Exercises of the School Book on Unit 4



1 Choose the correct answer :

1. Myelin sheath surrounds the ....
   a. nerve cell axon.   b. cerebellum.   c. spinal cord.
2. Reflex action takes place through the ....
   a. medulla oblongata.   b. cerebral hemispheres.   c. spinal cord.
3. The joint is the location of meeting of ....
   a. two bones.   b. a muscle with a bone.   c. two muscles.
4. .... fix muscles with bones.
   a. Tendons   b. Joints   c. Muscle fibres
5. Skulls joints are ....
   a. immovable.   b. slightly movable.   c. free movable.

2 Give the scientific term for each of the following statements :

1. The building unit of nervous system. (..............)
2. The organ which consists of an internal H-shaped grey matter surrounded with a white matter. (..............)
3. The autonomic body response towards different stimuli. (..............)
4. The skeleton which includes the upper and lower limbs. (..............)

3 Mention the location of the following parts in human body :

1. Medulla oblongata.
   ....
2. The H-shaped grey matter.
   ....
3. The cerebellum.
   ....
4. The spinal cord.
   ....



4 **State the importance of each of the following :**

1. Tendons.

....

2. Cerebellum.

....

3. Joints.

....

4. Cerebral hemispheres.

....

....

....

5. Ribcage.

....

....

5 **Give reasons for :**

1. The rapid withdrawal of the hand on sudden touching thorns of a plant.

....

....

2. Muscles play an important role in human movement.

....

....

3. Damage of medulla oblongata may lead to death.

....

....

Model Exam 1 on Unit 4





Answer the following questions :

1 Complete the following statements : *(5 marks)*

1. The brain consists of .... , ... and ....
2. The backbone consists of .... vertebrae, where .... is protected inside it.
3. The outer surface of the two hemispheres is a .... matter, while the outer surface of the spinal cord is a .... matter.
4. In the ribcage, there are .... pairs of ribs are connected to the sternum.
5. The nervous system consists of two main systems which are .... and ....

2 Choose the correct answer : *(5 marks)*

1. To maintain your locomotory system you must ....
   a. avoid straining the neck. b. avoid carrying heavy things.
   c. Exposure to sunlight for long periods. d. (a) , (b) and (c).
2. Eating healthy food rich in calcium, phosphorus and vitamin D ....
   a. prevent rickets. b. prevent heart disease.
   c. prevent osteomalacia. d. (a) and (c).
3. To maintain the human nervous system, you must ....
   a. stay away from tranquilizers. b. keep close to computer.
   c. live in noisy places. d. (a) and (c).
4. The peripheral nervous system consists of ....
   a. 31 pairs of cranial nerves and 12 pairs of spinal nerves.
   b. 12 pairs of cranial nerves and 31 pairs of spinal nerves.
   c. 31 pairs of spinal nerves only.
   d. 12 pairs of cranial nerves only.
5. .... is responsible for reflex action.
   a. Spinal cord and cerebellum b. Spinal cord
   c. Medulla oblongata d. Cerebrum.



3 **[A] From the opposite figure :** *(5 marks)*

1. What is the name of this labeled part (a) ? and determine its function ?

....

....

a

[B] Give the scientific term :

1. A cylindrical axis covered with a fatty layer in the nerve cell. (....................)
2. Joints which allow movement in one direction only. (....................)

4 **Look at the opposite figures, then answer the following questions :** *(5 marks)*

1. What is the name of fig. (a) and fig. (b) ?

....

....

2. Fig. (a) consists of .... and .... skeleton.
3. What is the function of ribcage ?

....

....

4. The skull protect ....
5. The bones of upper limbs are .... , ... and ....

Fig. (a) Fig. (b)

5 **[A] What happens when ... ?** *(5 marks)*

1. There is no backbone.

....

2. Your finger gets picked by plant thorns.

....

[B] Put (✓) or (✗) :

1. The cerebellum regulates heartbeats. ( )
2. The outer matter of spinal cord has the shape of letter (H). ( )
3. The central nervous system consists of cranial nerves and spinal nerves. ( )

Model Exam 2 on Unit 4



Answer the following questions :

1 Complete the following sentences : *(5 marks)*

1. The nerve cell consists of two main parts which are .... and ....
2. There are .... pairs of ribs in the ribcage, whereas there are .... pairs of nerves come out of the spinal cord.
3. The brain is protected by ...., while the spinal cord is protected by ....
4. The gray matter in the cerebrum is called ....
5. The backbone contains .... between its .... to prevent their friction.
6. The human locomotory system consists of .... system and the muscular system.

2 [A] What happens when ... ? *(5 marks)*

1. The medulla oblongata is damaged.

....

....

2. There are no tendons in the locomotory system.

....

....

[B] Correct the following sentences :

1. Upper limbs in human skeleton are connected to the pelvic bones.

....

2. The axon of a neuron ends in nerve endings called dendrites.

....

3. The muscles of the blood vessels are voluntary muscles.

....

3 [A] Give reasons for the following : *(5 marks)*

1. Your hand moves away quickly when it touches a hot surface.

....

2. Food rich in calcium, phosphorus and vitamin D are essential for your body.

....

3. Shoulder joint is a freely movable joint.

....



[B] Cross out the odd word, then write the scientific term for the remaining words :

1. Cerebrum - Spinal cord - Medulla oblongata - Cerebellum.
   - The odd word is ....
   - The scientific terms is ....
2. Femur - Foot bones - Skull - Shaft bones.
   - The odd word is ....
   - The scientific term is ....

4 Write the scientific term : *(5 marks)*

1. Joints that allow movement in all directions. (..................)
2. The main control center in the human body. (..................)
3. A part of the nervous system that is responsible for the reflex action. (..................)
4. The location at which bones meet each other. (..................)
5. The part of the brain that controls the involuntary processes in your body. (..................)

5 [A] Compare between : *(5 marks)*

Points of comparison	Cranial nerves	Spinal nerves
1. Definition :	....	....
2. Number :	....	....

[B] Look at the opposite figure, then label the numbered bones :

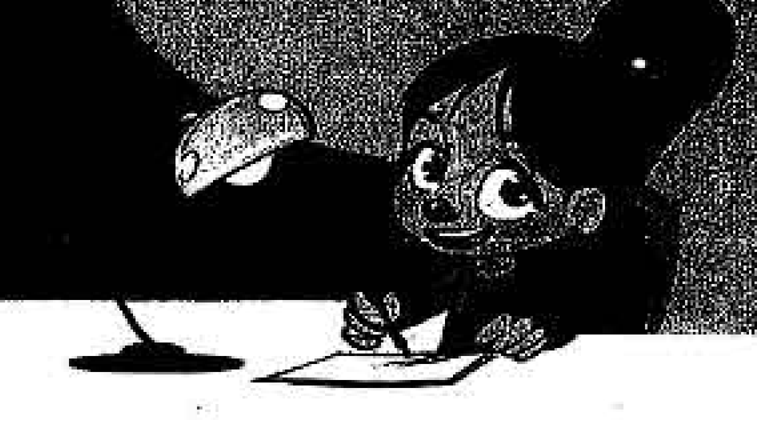
① .... bone.
② .... bones.
③ .... bones.



Final Revision

Unit One : Force and Motion.
Unit Two : Thermal Energy.
Unit Three : The Atmosphere.
Unit Four : Structure and Function.

Final Revision on Unit 1



1 Definitions

Item	Definition
1. Mass :	It is the amount of matter in an object.
2. Gram (gm) :	It is one of the measuring units of mass that nearly equals the mass of one paper clip.
3. Kilogram (kg) :	It is one of the measuring units of mass that equals the mass of one liter of distilled water.
4. Weight :	It is the force by which a body is attracted to the Earth. It is the gravitational force by which a body is attracted to the Earth.
5. Newton :	It is the measuring unit of weight and it is almost equal to the weight of an object on the Earth's surface whose mass is 100 grams.

2 Importance or use

Item	Importance or use
1. Gram (gm) :	It is a unit used to measure small masses such as jewellery.
2. Kilogram (kg) :	It is a unit used to measure large masses as fruits and vegetables.
3. Balance scale and one-arm scale with a pointer :	It is a device that is used to measure the large masses as cheese and vegetables.
4. Sensitive two-arms scale and one-arm digital scale :	It is a device that is used to measure small masses as gold and chemicals.
5. Spring scale :	It is a device that is used to measure the weight of any object.
6. The Earth's gravity :	It attracts all the objects towards the center of the Earth.

3 Give reasons for

1. **The mass of a body on the Earth's surface equals the mass of the same body on the moon's surface.**
   Because the mass of the body is a fixed value and it doesn't change by changing the place.





2. Object's falling downward the Earth.
Due to the effect of weight (gravitational force).

3. The balance scale should be placed horizontally on a stable shelf.
To avoid any vibration for the balance scale.

4. The force of the moon's gravity is less than the Earth's gravity.
Because the mass of the moon is less than the mass of the Earth, so the gravity of the moon is less than that of the Earth.

5. The weight of a person on the Earth's surface is larger than that on the moon's surface.
Because the Earth has greater mass and gravitational force than the moon.

6. The weight of a body in a flying balloon is smaller than that on Earth's surface.
Because the gravitational force of the Earth to the person in the balloon decreases as we go away from the center of the Earth.

7. The weight of an object changes according to the planet that the object exists on.
Because the gravity of a planet depends on its mass, so the weight of any object will change from a planet to another.

8. The wire of spring scale expands when a body is hanged to it.
Because the gravitational force of the Earth attracts the hanged body downward, that causes the expand of the wire of spring scale.

4 What happens when

1. You hang a body in the bottom hook of the spring scale.
The body pulls the wire of the spring downwards and the reading of the pointer increases.

2. The mass of an object increases.
Its weight increases.

3. The mass of an object decreases to half.
The weight of this object decreases to half.

4. The mass of the planet where the object exists increases.
The weight of this object increases.

5. There is no gravity on the Earth's surface.
All objects on the Earth's surface don't have weight.

6. You measure the weight of a toy car on the Earth's surface, then measure its weight on the moon's surface.
The weight of the toy car on the Earth's surface equals 6 times its weight on the moon's surface.

7. The distance between a person in a balloon and the center of the Earth increases.
The weight of the person decreases as the gravitational force of the Earth for this person decreases.



8. Transfering a body of 60 Newton weight from the Earth's surface to the moon's surface.
The weight of the body decreases to 10 Newton.



5 Comparisons

1. Between balance scale and sensitive two-arms scale.

Points of comparison	Balance scale	Sensitive two-arms scale
- Its type :	Two-arms scale.	Two-arms scale.
- Its use :	It is used to measure the large masses as cheese and vegetables.	It is used to measure the small masses as gold and chemicals.

2. Between mass and weight.

Points of comparison	Mass	Weight
- Definition :	The amount of matter in an object.	The gravitational force by which the body is attracted to the Earth.
- Measuring unit :	Kilogram or gram.	Newton.
- Measuring device :	Balance scale – Sensitive two arms scale – one arm digital scale – one arm scale with a pointer	Spring scale.
- The direction of its effect :	It has no direction.	Its effect is always directed towards the center of the Earth (downward).
- The effect of changing the place :	Constant. (It does not change with changing the place).	Variable (It changes with changing the place).

3. The balance scale and the spring scale.

Point of comparison	Balance scale	Spring scale
Use :	It is a device that is used to measure the mass of object.	It is a device that is used to measure the weight of object.





Activities



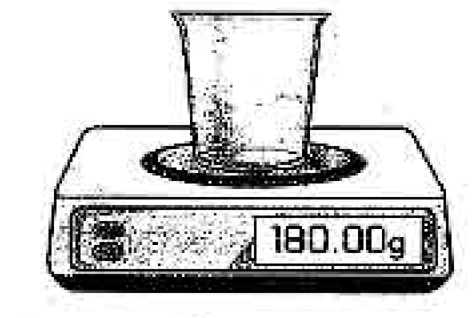
Activity 1 To know how to measure the mass of a liquid by a digital scale :

Steps:

1. Bring an empty beaker and record its mass by using the digital scale (M_1).
2. Put an amount of liquid (that needed to be measured) in the beaker, then record the total mass (M_2).
3. Subtract M_1 from M_2 to obtain the mass of the liquid only.




digital scale



Observation & Conclusion:

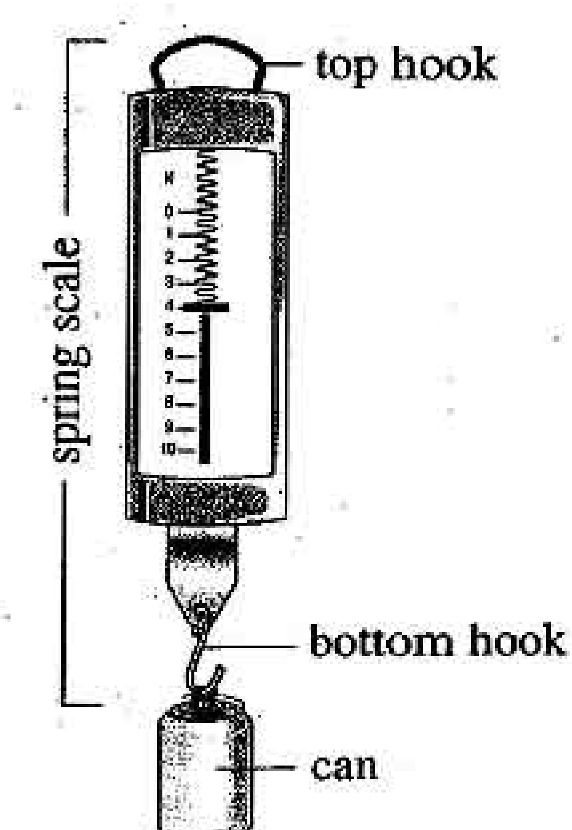
The mass of liquid = The mass of the beaker with liquid (M_2) – the mass of the empty beaker (M_1).



Activity 2 To know how to measure the weight of any object by the spring scale :

Steps:

1. Hold the spring scale from its top hook , then hang the body (as a can) in its bottom hook.
2. Let the object go down slowly.



Observation:

The can pulls the spring downwards and the reading of the pointer increases.

3. Wait until the object becomes stable to record the reading which refers to the object's weight.

Conclusion:

The weight of any object can be measured by the spring scale by **determining the extension of its spring.**







PART 2

7 Important laws and solved problems

1. **Object's weight on the Earth's surface (Newton) = its mass (kg.) × 10**

2. **Mass of any object on the Earth's surface = Mass of the same object on the moon's surface.**

3. **Object's weight on the moon (Newton) = its weight on the Earth (Newton) × $\frac{1}{6}$**

Example : If the object's mass = 60 kg on the Earth, calculate :

(a) **Its mass on the moon's surface.**

(b) **Its weight on the Earth's surface.**

(c) **Its weight on the moon's surface.**

Answer :

(a) Its mass on the moon's surface = Its mass on the Earth's surface = 60 kg.

(b) Its weight on the Earth's surface = Its mass × 10 = 60 × 10 = 600 Newton.

(c) Its weight on the moon's surface = its weight on Earth's surface × $\frac{1}{6}$

= 600 × $\frac{1}{6}$ = 100 Newton.

8 Important Points

- The types of scales are **two-arms scale** and **one-arm scale.**
- Two-arms scale is divided into **balance scale** and **sensitive two-arms scale**, while one-arm scale is divided into **one-arm digital scale** and **one-arm scale with a pointer**.
- **The weight of any object is affected by three factors which are :**

1. The object's mass, where :
Weight of any object **increases** by **increasing** its mass.

2. The planet (place), where the object exists :
When the mass of the planet **increases** , its gravitational force for an object **increases** , so the weight of the object **increases.**

3. The distance between the object and the center of the planet , where :
The weight of any body **decreases** when the distance between the body and the center of the planet **increases** as the gravitational force **decreases.**



Final Revision on Unit 2



1 Definitions

Item	Definition
1. Heat energy:	It is a form of energy that transfers from the higher temperature object to the lower temperature object.
2. Temperature :	It is the degree of hotness or coldness of a body.
3. Heat conductors :	They are the materials that let heat flow through.
4. Heat insulators :	They are the materials that do not let heat flow through.
5. Thermometer :	It is a device that is used to measure the temperature.
6. Medical thermometer :	It is the thermometer that is used to measure the temperature of the human being.
7. Celsius thermometer :	It is the thermometer that is used to measure the temperature of liquids.
8. Zero °C :	It is the melting point of ice or the freezing point of water.
9. 100 °C :	It is the boiling point of water.

2 Importance or use

Item	Importance or use
1. Heat energy (Thermal energy) :	1. It is important in our daily life in : a. Warming houses. b. Cooking. c. Heating water. d. Drying washed clothes. 2. It has many usages in industry as it is used in making and processing food, glass, paper, textiles, ...
2. Air :	It is used as a heat insulating material in making the insulating glass windows.
3. Aluminium, copper and stainless steel (good conductors of heat) :	They are used in making : a. Cooking pots. b. Kettles that are used in houses and factories.
4. Plastic and wood (bad conductors of heat) :	They are used in making the handles of : a. Cooking pots (utensils). b. Electric iron. c. Kettles.





5. Wool (bad conductor of heat) :	It is used in making : a. Heavy blankets. b. Woolen clothes.
6. Thermometers :	They are used to measure the temperature.
7. Medical thermometer :	It is used to measure the human body temperature.
8. Celsius thermometer :	It is used to measure the temperature of liquids.
9. The constriction in the medical thermometer :	It prevents mercury from returning back to the bulb quickly in order to read the measurement easily.
10. Ethyl alcohol :	It is used to sterilize the medical thermometer.
11. Mercury in thermometers :	It expands and contracts regularly according to the change in temperature, in order to determine the temperature of objects.

3 Give reasons for

1. Heat is an important form of energy in our daily life.
Because it is used in :
a. Warming houses. b. Cooking.
c. Heating water. d. Drying washed clothes.

2. Heat has countless usages in industry.
Because it is used in making and processing food, glass, paper and textiles.

3. Copper, iron and aluminium are good conductors of heat.
Because they allow heat to flow through.

4. Wood, glass, plastic and paper are bad conductors of heat (insulators).
Because they don't allow heat to flow through.

5. Wood is a heat insulator, while copper is a heat conductor.
Because wood doesn't let heat flow through, while copper allows heat to flow through.

6. In the insulating glass window, there is a space filled with air between the two glass sheets.
To prevent the leakage of heat.

7. Leaving spaces between the railway bars.
To avoid train accidents where, iron is a good heat conductor that expands and twists by heat.

8. **Plastic differs from copper in conducting heat.**
   Because plastic doesn't let heat flow through, while copper lets heat flow through.

9. **Copper differs from iron and aluminium in conducting heat.**
   Because copper conducts heat faster than aluminium and iron.

10. **Cooking utensils are made of copper, aluminium or stainless steel.**
    To allow heat to flow through as they are good conductors of heat.

11. **The handles of cooking utensils (pots) or kettles are made of plastic or wood.**
    Because they don't let heat flow through as they are bad conductors of heat.

12. **Aluminium, copper and stainless steel are very important heat conductors.**
    Because they are used in making cooking pots (utensils) and kettles that are used in houses and factories.

13. **The handle of electric iron is made of plastic.**
    Because plastic doesn't let heat flow through as it is a bad conductor of heat (insulator).

14. • **We use the heat insulators as wool in making heavy blankets and woolen clothes.**
    • **It is necessary to wear woolen clothes in winter.**
    To keep our bodies warm as they prevent the leakage of heat.

15. **Cooking pots are made of aluminium, while their handles are made of plastic or wood.**
    Because aluminium is a good conductor of heat, while plastic and wood are bad conductors of heat.

16. **We can't measure the temperature of objects by touching.**
    Because the sense of touching helps us to know if the object is hot or cold only, but it can't measure the temperature accurately.

17. **There is a constriction in the medical thermometer.**
    To prevent mercury from returning back to the mercury bulb quickly in order to read the measurement easily.

18. **The medical thermometer must be put in ethyl alcohol before using.**
    To sterilize the medical thermometer before using.

19. **We must shake the medical thermometer well before using.**
    To force the mercury back to the mercury bulb.

20. **The thermometer must be kept out the reach of children.**
    Because mercury inside the thermometer is a toxic substance.



21. The medical thermometer can't measure the temperature of iced water.
Because the scale of the medical thermometer ranges from 35°C to 42 °C and the temperature of iced water is zero °C.

22. • We can't measure the boiling point of water by using the medical thermometer.
• Boiling water is not used to sterilize the medical thermometer.
Because the scale of the medical thermometer ranges from 35°C to 42°C and the boiling point of water is 100°C, so the thermometer will be broken.

23. Mercury is used in making thermometers.
Because mercury :
a. is a liquid metal that can be seen easily through the thermometer glass.
b. is a good conductor of heat.
c. is a regular expanding material.
d. doesn't stick to the walls of the capillary tube.
e. gives a wide range to temperature measurement.

24. Mercury gives wide range to measure the temperature.
Because it remains in liquid state between (-39°C) and (357°C).

25. The idea of making thermometers depends on changing the volume of liquid by changing temperature.
Because liquid expands by heating and contracts by cooling.

26. You feel cold when touching a piece of ice.
Because the temperature of my hand is higher than that of ice, so heat transfers from my hand to the piece of ice and I feel cold.

What happens when...?

1. You touch a hot cup of tea.
I feel hot due to the transfer of heat from the hot cup of tea to my hand.

2. You hold a piece of ice in your hand.
I feel cold due to the transfer of heat from my hand to the piece of ice.

3. You touch one end of a copper rod, where the other end is exposed to a flame of a candle.
I feel hot, because copper is a good conductor of heat.

4. You touch the end of a glass rod, where the other end is exposed to a flame of a candle.
I don't feel hot, because glass is a bad conductor of heat.

5. Two bodies have the same temperature touch each other.
Heat doesn't transfer from one body to the other as they have the same temperature.

6. There are no spaces between the railway bars.
Train accidents will occur.

7. The handles of kettles and cooking utensils are made of stainless steel.
We can't hold them with our hands as stainless steel is a good conductor of heat.



8. **All substances, that the man uses are good conductors of heat.**
We can't make handles of cooking pots and also we can't make heavy clothes that keep us warm in winter.

9. **A medical thermometer is put in boiled water.**
The medical thermometer will be damaged, because the boiling point of water is 100°C.

10. **There is no constriction above the mercury bulb in the medical thermometer.**
The mercury will return back quickly to the mercury bulb before determining the temperature reading.

11. **Water is used instead of mercury in making thermometers.**
The thermometer can't measure the temperature, because water is not a regular expanding material.

12. **We don't shake the medical thermometer well before use.**
We can't measure the temperature accurately.

13. **The medical thermometer is not sterilized before use.**
We may be infected with some diseases.

14. **Increasing the temperature of mercury.**
Mercury will expand regularly.

5 Comparisons

1. Between heat conductors and heat insulators.

Points of comparison	Heat conductors	Heat insulators
1. Definition :	They are materials that let heat flow through.	They are materials that don't let heat flow through.
2. Examples :	Copper , aluminium , iron and stainless steel.	Glass, wood, paper, plastic, wool, air, liquids and rubber.
3. Uses :	They are used in making : 1. Cooking pans (utensils). 2. Kettles (boilers).	They are used in making : 1. The handles of : - Cooking utensils. - Electric iron. - Kettles. 2. Heavy blankets and woolen clothes.



2. *Between Celsius thermometer and medical thermometer.*

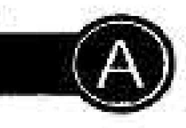
Points of comparison	Celsius thermometer	Medical thermometer
1. Structure :	a. Transparent thick glass tube. b. Very thin capillary tube. c. Mercury bulb that is filled with mercury.	
2. Range of scale :	From 0°C to 100°C.	From 35°C to 42°C.
3. Constriction :	Absent.	Present.
4. The used liquid :	Mercury.	Mercury.
5. Usage :	It is used to measure the temperature of liquids.	It is used to measure the temperature of the human body.



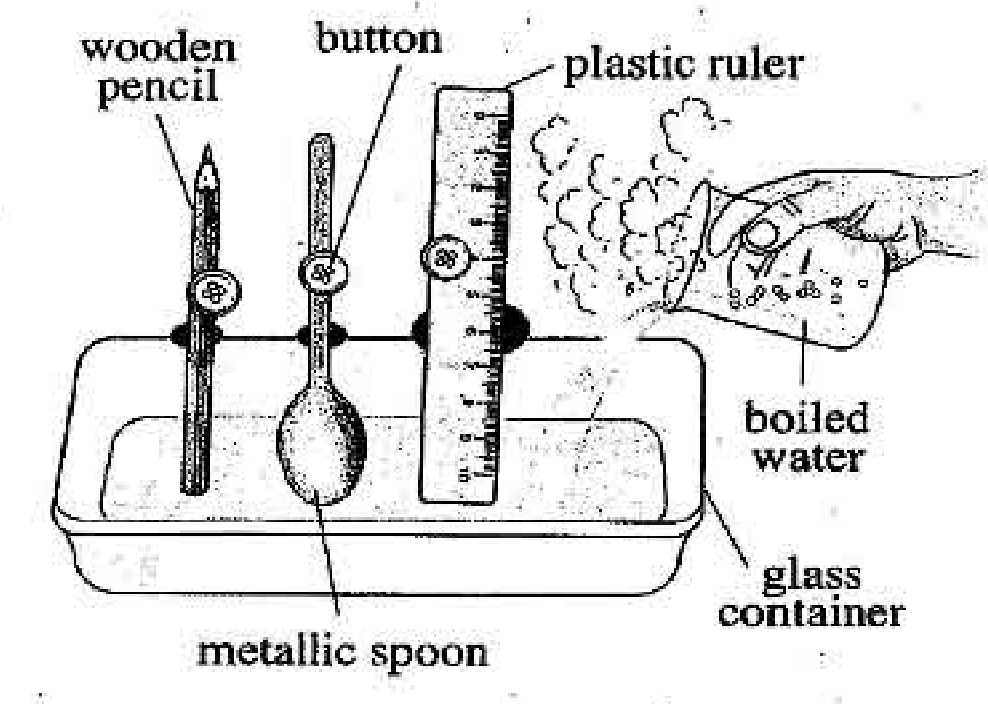
6 Activities



Activity 1 To show the ability of elements to conduct heat.



A



Steps:

1. Stick a button on a ruler , a spoon and a pencil using molten wax , then fix them. at one edge of the container using clay.
2. Pour boiled water in the container to be half filled.

Observation:

The button falls from the metallic spoon.



Conclusions:

1. Materials are different in conducting heat.
2. Materials can be classified into heat conductors and heat insulators.



Steps:

1. Bring four rods nearly equal in length and thickness from wood, aluminium, plastic and iron.
2. Put the beaker containing water on the flame.
3. Put the four rods inside the hot water.
4. Touch the end of each rod with your finger.

Observation:

1. You feel hot when touching aluminium and iron rods.
2. You don't feel hot when touching wood and plastic rods.

Conclusions:

1. Materials are different in conducting heat.
2. Materials can be classified into heat conductors and heat insulators.



Activity 2 To show that metals are different in conducting heat.

Steps:

1. Stick an office pin on one tip of each metallic rod (a , b , c) using molten wax.
2. Put the three metallic rods on the two racks as shown in the figure.

Observation:

The pin (a) falls first , then the pin (b) and at the end the pin (c).

Conclusion:

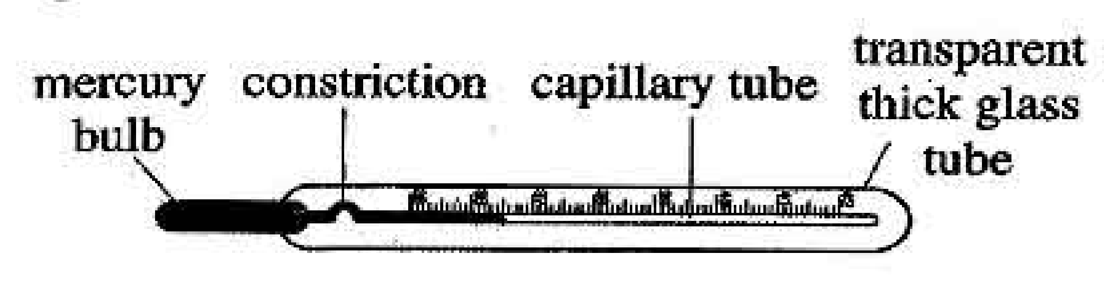
The different metals differ in conducting heat.

, Where :

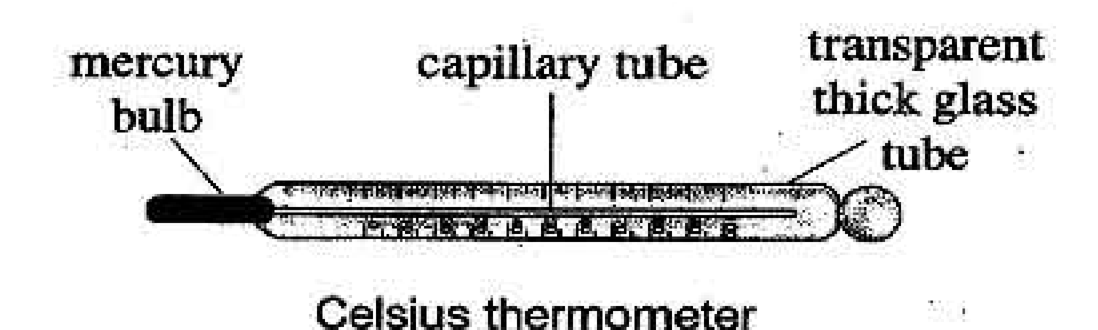
- Copper conducts heat faster than aluminium.
- Aluminium conducts heat faster than iron.

PART 2

7 Important devices



Medical thermometer



Celsius thermometer

8 Important points

- Materials are divided according to the conductivity of heat into **good conductors** of heat (heat conductors) and **bad conductors** of heat (or heat insulators).
- **Copper, iron, stainless steel** and **aluminium** are good conductors of heat.
- **Wood, glass, plastic, rubber, paper, liquids, wool** and **gases** especially air **are** bad conductors of heat.
- All metals are good conductors of heat.
- Metals are different in conducting heat, which means that some metals conduct heat faster than the other.
- Copper conducts heat faster than aluminium, while aluminium conducts heat faster than iron.
- In medical thermometer, each degree is divided into 10 parts, so each part equals $\frac{1}{10}$ degree.
- In Celsius thermometer, the distance between **zero°C** and **100°C** is divided into **100 parts,** where each part equals one degree.

- How to use the medical thermometer to measure your body temperature ?

1. Sterilize the medical thermometer using ethyl alcohol.
2. Dry the thermometer very well using a tissue paper.
3. Shake the thermometer well until the mercury returning back to the bulb.
4. Put the thermometer under your tongue for a minute.
5. Get the thermometer out from your mouth, then record the temperature reading.
6. Sterilize the thermometer using ethyl alcohol and put it in its box.



- Don't seize the medical thermometer firmly with your teeth in order not to be broken because mercury is a toxic substance.
- The normal temperature of the healthy person **is 37°C.**
- While recording the temperature, the Celsius thermometer must be **vertical** and the direction of sight must be **perpendicular** to the thermometer.
- The Swedish scientist "Anders Celsius" created the Celsius scale in 1742.
- Mercury remains liquid between two degrees temperature which are (– 39°C) and (357°C) and this gives a wide range to temperature measurement.

Final Revision on Unit 3



1 Definitions

Item	Definition
1. The atmosphere :	It is a mixture of different gases surrounding the Earth.
2. Catalyst :	A chemical substance that remains without any change in its quantity and structure during the chemical reaction.
3. Ozone :	A gas that its molecule is composed of three oxygen atoms.
4. Oxidation :	It is a slow combination between oxygen and element in the presence of moisture (water).
5. Burning (combustion) :	It is a rapid combination (union) between oxygen and element producing heat and light.

2 Importance or use

Item	Importance or use
1. The atmosphere :	1. It protects the Earth by absorbing ultraviolet radiation coming from outer space. 2. It adjusts the temperature of the Earth's surface.
2. Hydrogen peroxide :	It is used to prepare oxygen, where it dissociates in the presence of manganese dioxide into oxygen and water.
3. Oxygen :	1. It is important for all living organisms as it is used in : - Respiration and combustion of food inside living cells to produce energy necessary for all vital processes. - Formation of water that is composed of one oxygen atom combines with two hydrogen atoms. 2. It forms ozone layer (O_3) that protects the Earth from harmful radiation that come from the Sun. 3. It is compressed in iron cylinders to be used : - In mechanical ventilation for patients who suffer from breathing difficulties. - During surgeries. - During diving and climbing mountains. 4. It combines with acetylene gas to produce oxy-acetylene flame which is used in cutting and welding metals.



4. Limewater :	It is used to detect the presence of carbon dioxide gas.
5. Carbon dioxide :	1. It is used in making dry ice which is used in refrigeration. 2. It is used in extinguishing fires. 3. It is used in making soft drinks. 4. It is used in making bubbled and tasty bread when adding yeast to dough. 5. It is necessary for photosynthesis process of green plants to produce food and oxygen gas.
6. Soil bacteria :	They take the atmospheric nitrogen and convert it into protein.

3 Give reasons for

1. **Although oxygen is consumed during respiration, its percentage remains stable in the atmosphere.**
   Because the consumed oxygen gas during respiration and combustion processes is compensated by the green plants during photosynthesis process.

2. **Although smoke and dust particles in the atmosphere are considered air pollutants, they have an important role in the formation of rains and snow.**
   Because they help in the condensation of water vapour in air and falling rains or snow.

3. **The atmosphere has a great importance for the continuity of life on the Earth.**
   Because the atmosphere :
   - Absorbs ultraviolet radiations coming from outer space.
   - Adjusts the temperature of the Earth's surface.

4. **Oxygen is collected by downward displacement of water.**
   Because oxygen scarcely dissolves in water.

5. **Manganese dioxide remains without any change in its quantity and structure during the preparation of oxygen.**
   Because it acts in this reaction as a catalyst.

6. **Manganese dioxide acts as a catalyst during the preparation of oxygen.**
   Because it remains without any change in its quantity and structure during the reaction.



7. **When you turn a cylinder filled with oxygen over another cylinder filled with air, oxygen gas replaces air in the lower cylinder.**
   Because oxygen is heavier than air.

8. **A burning match is still burning when it is placed in a cylinder filled with oxygen.**
   Because oxygen helps in burning.

9. **When you burn a ball of cleansing wire strongly , its mass increases.**
   Because oxygen combines with iron (cleansing wire) forming iron oxide that its mass is higher than that of iron.

10. **Rusting of iron has many disadvantages.**
    Because it causes corrosion and damage of ironware such as bridges' pillars.

11. **Iron nails rust when exposed to moist air.**
    Because iron combines with oxygen of air in the presence of moisture (water) forming a layer of rust that causes corrosion.

12. **Oxygen cylinders are used during climbing mountains.**
    Because the ratio of oxygen gas decreases when we rise above the Earth's surface.

13. **Oxy-acetylene flame is used for cutting and welding metals.**
    Because the temperature of oxy-acetylene flame reaches 3500°C which is sufficient to cut or weld metals.

14. **Ozone layer is very important for the life of all living organisms.**
    Because it protects the Earth from harmful radiations that come from the Sun.

15. **Divers use oxygen cylinders during diving under the water surface.**
    Because oxygen gas is necessary for respiration under the water surface.

16. **The pillars of the bridges are isolated from the atmospheric air by paints.**
    To protect them from iron rusting that causes corrosion and damage of the pillars of bridges.

17. **Clear limewater is used to detect the presence of carbon dioxide gas.**
    Because clear limewater turns into milky when carbon dioxide gas passes through it.



18. Carbon dioxide gas is collected by upward displacement of air.
Because it is heavier than air.

19. Carbon dioxide gas is not collected by downward displacement of water.
Because it easily dissolves in water.

20. Clear limewater gets turbid if carbon dioxide gas passes through it.
Due to the formation of calcium carbonate (white ppt.) which is insoluble in water and causes the turbidity of limewater.

21. It is danger to increase the percentage of CO_2 in air.
Because it causes :
- Suffocation of living organisms.
- Global warming.

22. Burning a magnesium ribbon in the presence of carbon dioxide gas produces white and black substances.
Because it produces magnesium oxide which is a white substance and carbon (coal) which is a black substance.

23. Decreasing the green areas is harmful.
Because this increases the percentage of carbon dioxide gas.

24. Carbon dioxide is used in extinguishing fires.
Because it doesn't burn and doesn't help in burning.

25. Yeast is added to dough on making bread.
Because yeast produces carbon dioxide during fermentation which expands by heat making the bread porous and tasty.

26. Photosynthesis process is important for plants and all living organisms.
Because during photosynthesis process , the plant produces food and oxygen which is necessary for respiration of all living organisms.

27. The environment suffers from increasing the percentage of carbon dioxide gas in recent years.
Due to :
- Burning a large amount of fuel in factories and means of transport.
- The removal of forests.



28. The removal of forests leads to the increase in the percentage of carbon dioxide gas in nature.

Because plants take carbon dioxide gas to make their own food by photosynthesis process.

29. Carbon dioxide gas has a great importance for the continuity of life on the Earth.

Because green plants use carbon dioxide gas in photosynthesis process to produce its own food and oxygen gas which is important for respiration of all living organisms.

30. Carbon dioxide gas has many benefits.

Because it is used in :

- Making dry ice, soft drinks and bread.
- Photosynthesis process.
- Extinguishing fires.

31. • Nitrogen contributes in the composition of all living tissues.

• Nitrogen is very important in the human's life.

Because it forms protein which is necessary for building up living tissues.

32. Nitrogen is very important for legumes.

Because legumes need nitrogen gas to form protein by the help of special type of bacteria (nodular bacteria) that live in their roots.

33. Nitrogen is called azote which means lifeless.

Because nitrogen gas doesn't help in burning.

34. The main source to prepare nitrogen is the air.

Because nitrogen forms 78% of the volume of atmospheric air.

4 What happens when...?

1. There is no the atmosphere.

The ultraviolet radiations will reach the Earth from the outer space, so the temperature of the Earth will be variable.

2. There is no oxygen in the atmosphere.

Living organisms cannot respire, so they will die.

3. **Leaving iron nails in moist air for a long time.**
Iron will combine with oxygen in the presence of moisture (water), so iron nails will rust.

4. **Ozone layer is decayed.**
The harmful radiations coming from the Sun will reach the Earth and cause harms to living organisms.

5. **The percentage of oxygen gas in air is more than 21%**
We cannot control burning processes as oxygen helps in burning.

6. **A lighted magnesium ribbon is placed in a jar filled with oxygen.**
Magnesium oxide which is white matter is formed.

7. **The percentage of oxygen gas decreases in the atmosphere.**
The living organsims can't respire and the combustion process doesn't occur.

8. **Putting a burning fragment in a cylinder filled with oxygen.**
The burning fragment is still burning.

9. **The mass of cleansing wire befor and after heating.**
Its mass increases after burning due to the combination with oxygen.

10. **Hydrogen peroxide is dropped over manganese dioxide.**
Hydrogen peroxide is decomposed into water and oxygen gas, while manganese dioxide doesn't change in its quantity or structure.

11. **The bridges' pillars are not isolated with paints.**
They will rust causing damage to the bridges.

12. **One carbon atom linked with two oxygen atoms.**
A molecule of carbon dioxide will be formed.

13. **The percentage of carbon dioxide in air increases.**
- The temperature of the Earth will increase.
- The living organisms will suffocate.

14. **The percentage of carbon dioxide in air decreases.**
Green plants cannot make photosynthesis process, so the percentage of oxygen will decrease in the atmosphere and living organisms will die.







PART 2

15. Most of forests on the Earth are removed.

The percentage of carbon dioxide will increase in air that raises the temperature of the atmosphere and causes suffocation of living organisms.

16. You blow in a jar contains clear limewater.

Limewater turns into milky due to the presence of carbon dioxide in the exhaled air.

17. Dilute hydrochloric acid is dropped over calcium carbonate.

They will react together and carbon dioxide gas will evolve.

18. A lighted candle is put in a cylinder filled with carbon dioxide gas.

The lighted candle will extinguish.

19. A lighted magnesium ribbon is inserted in a cylinder filled with CO_2

Magnesium ribbon keeps burning for a short time producing magnesium oxide which is a white substance and carbon which is a black substance.

20. Lemon juice reacts with sodium bicarbonate.

Carbon dioxide gas is evolved.

21. The pressure on liquefied carbon dioxide is relieved.

Dry ice is formed which is used in refrigeration.

22. Yeast is added to dough on making bread.

Carbon dioxide gas is produced during fermentation, so the bread becomes porous and tasty.

23. Drinking big quantities of soft drinks.

This causes osteoporosis and may cause death.

24. Nitrogen gas is not present in the atmospheric air.

The protein substance that builds up the bodies of all living organisms is not formed.

25. Oxygen reacts with nitrogen during lightning.

Nitrogen oxides are formed, where they reach the soil during rainning.

26. Getting rid of soil bacteria.

Legumes as clover, peas and soybeans can't make protein.





5 Comparisons

1. Compare between oxidation and burning (combustion).

Points of comparison	Oxidation	Burning (combustion)
1. Definition :	It is a slow combination (union) between oxygen and element in the presence of moisture (water).	It is a rapid combination (union) between oxygen and element producing heat and light.
2. Example :	Iron rusting.	Burning a piece of cleansing wire.

2. Compare between oxygen, carbon dioxide and nitrogen.

Points of comparison	Oxygen	Carbon dioxide	Nitrogen
1. Its percentage in air :	21%	0.03%	78%
2. Structure :	Its molecule is composed of two oxygen atoms linked together.	Its molecule is composed of one carbon atom linked with two oxygen atoms.	Its molecule is composed of two nitrogen atoms linked together.
3. Symbol :	O_2	CO_2	N_2
4. Properties :	- It is a colourless, tasteless and odorless gas. - It scarcely dissolves in water. - It doesn't burn, but it helps in burning. - It is heavier than air, so it replaces air. - It combines with a lighted magnesium ribbon forming magnesium oxide (white matter).	- It is a colourless and odorless gas. - It easily dissolves in water. - It doesn't burn and doesn't help in burning so, it is used in extinguishing fires. - It reacts with a magnesium ribbon forming magnesium oxide (white powder) and carbon or coal (black substance) that deposits on the wall of the cylinder. - It is heavier than air, so it is collected by upward displacement of air.	- It is a colourless, tasteless and odorless gas. - It scarcely (hardly) dissolves in water. - It doesn't help in burning.





Activities



Activity 1 To show that oxygen forms one fifth of the air volume.



Steps:

1. Fix a lighted candle inside a basin containing coloured water.
2. Cover the candle with a graduated cylinder.
3. Determine the level of water inside and outside the cylinder.



Observation:

The lighted candle extinguishes and water rises inside the cylinder with one fifth ($\frac{1}{5}$) of its volume.



Conclusion:

Oxygen occupies one fifth (21%) of the air volume.

Activity 2 To show the preparation of oxygen in the laboratory.

Steps:

1. Set up the apparatus that shown in the opposite figure.
2. Pour some manganese dioxide in the flask.
3. Fill the funnel with hydrogen peroxide.
4. Open the tap to allow the leaking of some hydrogen peroxide on manganese dioxide.

Observation:

The formation of a gas at the top of the cylinder.

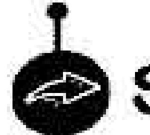
Conclusion:

Hydrogen peroxide dissociates (decomposes) in the presence of manganese dioxide into water and oxygen.



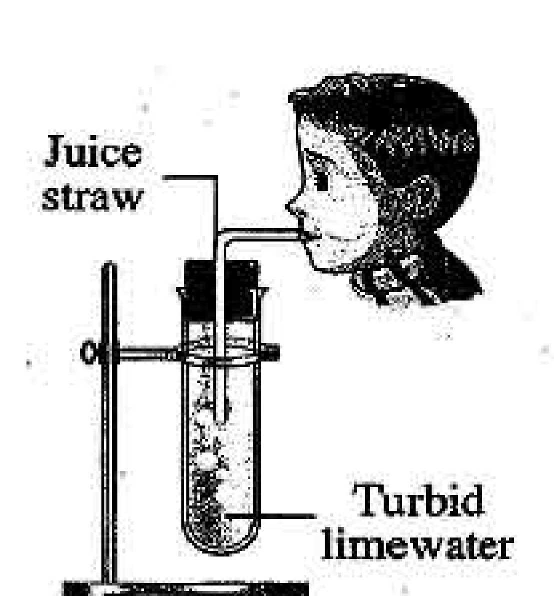


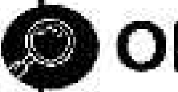
Activity 3 To detect the presence of carbon dioxide gas in the exhaled air.



Steps:

1. Put an amount of clear limewater in a tube.
2. Blow in limewater for two minutes using the juice straw.





Observation:

Limewater becomes turbid (milky).



Conclusions:

1. Exhaled air contains carbon dioxide gas.
2. Carbon dioxide gas turbids the clear limewater.



Activity 4 To detect the presence of carbon dioxide during combustion of a candle.



Steps:

1. Put a lighted candle in a cylinder, then cover the cylinder with a glass cover.

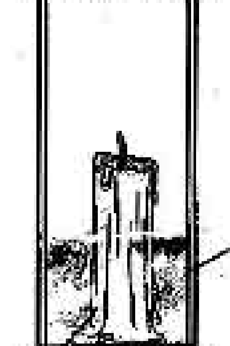


Glass cover
Cylinder

Observation:

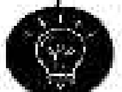
After a while, the candle is extinguished.

2. Remove the glass cover and pour a little amount of clear limewater inside the cylinder and cover it again.



Observation:

Limewater turns into milky (turbid).



Conclusion:

Carbon dioxide gas is produced during the combustion of a candle.

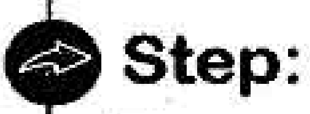




PART 2



Activity 5 To show that carbon dioxide doesn't burn and doesn't help in burning.



Step:

Turn a cylinder filled with CO_2 upside down on a lighted candle.

Cylinder
Glass cover

Observation:

The lighted candle will extinguish.

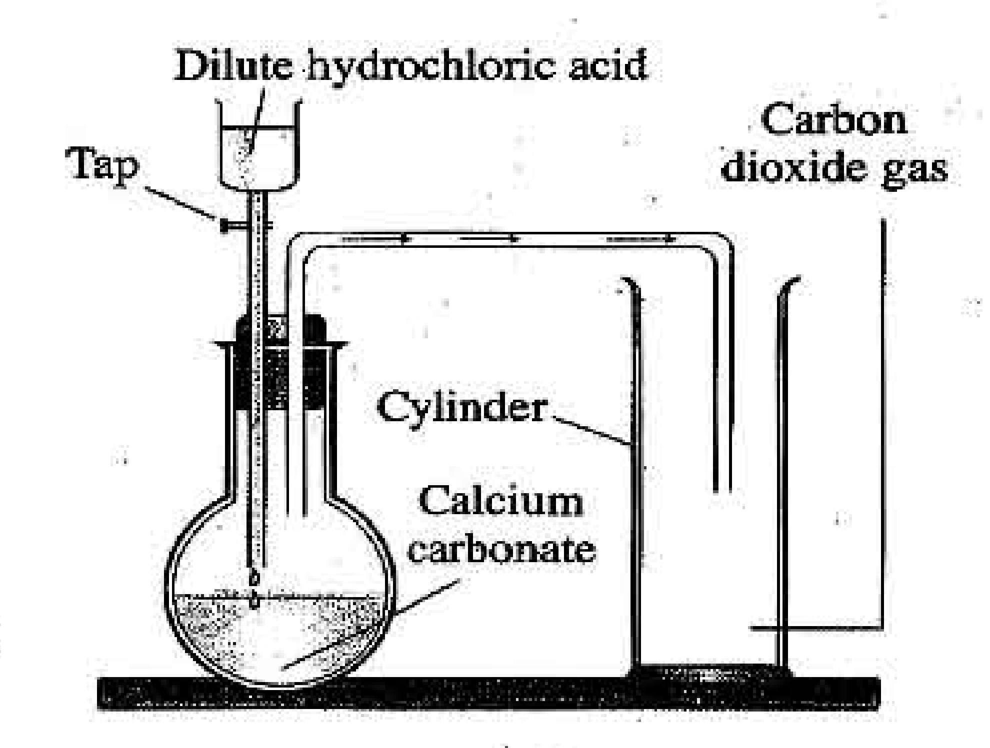
Conclusion:

Carbon dioxide doesn't burn and doesn't help in burning.

Activity 6 To show the preparation of carbon dioxide gas in laboratory.

Steps:

1. Set up the shown apparatus as in the opposite figure.
2. Pour some dilute hydrochloric acid on calcium carbonate that found in the flask.



Observation:

Carbon dioxide gas evolves, then passes in the tube to be collected in the cylinder.

Conclusions:

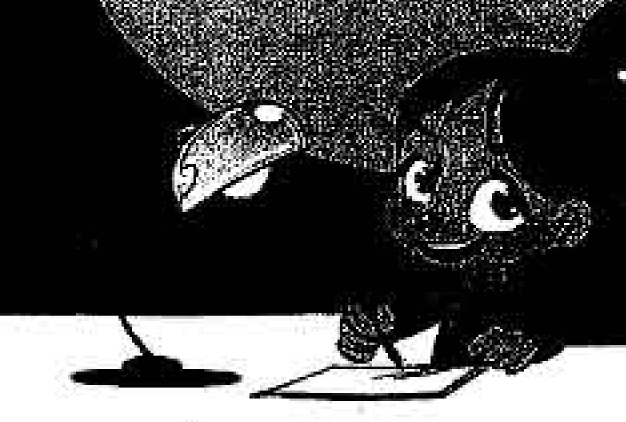
1. Carbon dioxide gas is prepared by adding dilute hydrochloric acid to calcium carbonate.
2. Carbon dioxide gas is prepared by upward displacement of air not water, because it is heavier than air and easily dissolves in water.



Important points

1. **Carbon dioxide** gas and other gases (such as water vapour, argon, neon, helium and others) represent 1% of the atmosphere.
2. **Hydrogen peroxide** $\xrightarrow[\text{as a catalyst}]{\text{Manganese dioxide}}$ **Water + Oxygen.**
3. **Oxygen** has the ability to combine (unite) directly with most elements forming element oxide.
4. Ironware must be isolated by paints **to protect them from iron rusting**.
5. The mass of materials **increases** after combination with oxygen.
6. Oxygen was discovered in **China in 800 B.C.,** then it was re-discovered by **Joseph Priestley** in August 1774.
7. **Antoine Lavoisier** gave oxygen its name in 1778.
8. **Lemon juice** reacts with sodium bicarbonate to produce carbon dioxide gas.
9. **The atmospheric** air is the main source of nitrogen on the Earth's surface.

Final Revision on Unit 4



1 Definitions

Item	Definition
1. Nervous system :	It is a communication and controlling body system.
2. Nerve cell (neuron) :	It is the building (or basic structure) unit of the nervous system.
3. The axon :	It is a cylindrical axis covered with a fatty layer called myelin sheath.
4. Dendrites :	They are branches extending from the neuron's body.
5. The brain :	It is a nerve block containing millions of nerve cells (neurons) and it is the main control center in the human body.
6. Spinal cord :	It is a cylindrical cord from which the spinal nerves extend.
7. The peripheral nervous system :	It is the nerves which emerge from the central nervous system (the brain and the spinal cord).
8. Cranial nerves :	They are 12 pairs of nerves that emerge from the brain.
9. Spinal nerves :	They are 31 pairs of nerves that emerge from the spinal cord.
10. Reflex action :	It is the automatic (spontaneous) response of the body to different stimuli.
11. Movement :	It is the ability of organism to change its position from one place to another.
12. Skull :	It is a bony box contains cavities for eyes, ears and nose.
13. The joint :	It is the location at which bones meet each other.
14. Immovable joints :	They are joints that don't allow any movement.
15. Slightly movable joints :	They are joints that allow movement in one direction only.
16. Freely movable joints :	They are joints that allow movement in all directions.

2 Importance or use

Item	Use
1. Dendrites :	They are connected to the neighbouring neurons to form synapse.
2. Axon terminals :	They are connected to the muscles or form a synapse with the dendrites of other neurons.
3. Brain :	It directs and coordinates all the processes, ideas, behaviours and emotions.
4. Cerebrum (the two cerebral hemispheres) :	- It controls the voluntary movements of the body such as running in races. - It receives nerve impulses from the sense organs (sensory centers) and sends the suitable responses to these impulses. - It contains the centers of thinking and memory.
5. Cerebellum :	It maintains the balance of the body during the movement.
6. Medulla oblongata :	It is responsible for regulating the involuntary processes of the body as : - Regulating heartbeats. - Regulating the movement of the respiratory system parts during breathing. - Regulating the movements and functions of the digestive system.
7. Spinal cord :	- It delivers the nerve messages from the body organs to the brain and vice versa. - It is responsible for the reflexes.
8. Peripheral nervous system (nerves) :	It delivers the sensory information and the kinetic responses between the central nervous system and all parts of the body.
9. Nervous system :	- It carries the nerve messages (impulses) from one of the body areas to another. - It regulates and coordinates all the vital processes within the body. - It receives the external stimuli that surround the human being through the sensory organs, then identifies and interprets them.



PART 2

10. The skull :	It protects the brain.
11. The backbone :	- It allows the body to bend in different directions. - It protects the spinal cord.
12. Cartilages :	They prevent friction between vertebrae (bone) during movement.
13. The ribcage :	- It protects the lungs and the heart. - It helps in the inhalation and exhalation processes (breathing).
14. Upper limbs :	They allow eating, drinking, writing and holding things.
15. Lower limbs :	They allow walking, running, standing and carrying the rest of the body.
16. The joints :	They allow the movement between bones.

3 Give reasons for

1. Dendrites extend from the neuron's body.

To connect the neuron's body with the neighbouring neurons forming synapse.

2. The axon ends with nerve endings.

To form a synapse with other neurons or to connect with the muscles.

3. Brain is the main control center in the human body.

Because it directs and coordinates all the processes, ideas, behaviours and emotions.

4. The cerebrum helps you to win in races.

Because it controls the voluntary movements as running in races.

5. The medulla oblongata keeps you alive during sleeping.

Because it is responsible for regulating the involuntary processes as :

- Regulating the heartbeats.
- Regulating the movement of the respiratory system parts during breathing.
- Regulating the movements and functions of the digestive system.



6. Cerebrum is a very important part of the brain.
Because it :
- Controls the voluntary movements of the body as running in races.
- Receives nerve impulses from sense organs and sends the suitable responses to these impulses.
- Contains the centers of thinking and memory.

7. Cerebellum has a great importance during the movement of the body.
Because it maintains the balance of the body during its movement.

8. The medulla oblongata helps in digestion.
Because it regulates the movements and functions of the digestive system's organs.

9. The brain is located inside the skull and the spinal cord extends through the inside of the backbone.
Because the skull protects the brain and the backbone protects the spinal cord.

10. Damage of medulla oblongata leads to death.
Because medulla oblongata controls all the involuntary processes (as heartbeats, movement of the respiratory system parts during breathing, movement and functions of the digestive system).

11. • It is important to prevent exhausting the sensory organs.
• You must stay away from the sources of pollution.
• You must sleep a sufficient periods of time.
• It is important not to take sleeping pills without the doctor's prescription.
To maintain the nervous system healthy.

12. You must reduce the intake of the stimulating substances such as tea and coffee.
To maintain the nervous system healthy as they affect the sleeping periods, the heartbeats and lead to nervous tension.

13. The withdrawal of the hand quickly when it suddenly touches a hot surface.
Due to the reflex action made by the spinal cord.

14. The nervous system has a special importance in the human body.
Because :
- It carries the nerve messages from one of the body areas to another.
- It regulates and coordinates all the vital processes within the body.
- It receives the external stimuli that surround the human being through the sensory organs, then identifies and interprets them.





PART 2

15. Addiction passively affects on the nervous system.

Because it causes retardation of memory and learning, nervous tension, sluggishness, loss time sensation and sleepless.

16. The movement is very important to living organisms (human).

Because it helps in moving from a place to another seeking for benefit or away from harm.

17. The presence of the brain inside the skull.

To protect the brain.

18. There are cartilages between the vertebrae of the backbone.

To prevent the friction between vertebrae during motion.

19. The backbone is very important.

Because it allows the body to bend in different directions and it protects the spinal cord.

20. The ribcage surrounds both the heart and the lungs.

To protect the heart and the lungs.

21. The knee joint is a slightly movable joint.

Because it allows the movement in one direction only.

22. The thigh joint is a freely movable joint.

Because it allows the movement in all directions.

23. The joints between the bones of the skull are immovable.

Because they don't allow any movement.

4 What happens when...?

1. The absence of dendrites and axon terminals.

The synapse are not formed.

2. Damage of medulla oblongata.

All the involuntary processes of the body will be disturbed and causes death.

3. The cerebellum is shocked hardly.

The body will lose its balance.



4. • **Your finger gets pricked by the plant thorns.**
   • **Touching a very hot surface.**
   The withdrawal of your hand will occur quickly.

5. **Approaching something to your eye.**
   The blinking of the eyelashes will occur.

6. • **The body doesn't take a sufficient period of rest.**
   • **Sitting for long times in front of the computer.**
   • **Continuous exposure to contaminated air by the factories smoke.**
   • **Human is exposed to noise constantly.**
   The nervous system will be exhausted.

7. **The over intake of stimulants such as tea and coffee.**
   The nervous system will be exhausted as they lead to nervous tension and affect the heartbeats and the sleeping periods.

8. **Taking drugs.**
   It will cause sleepless, nervous tension, sluggishness, retardation of memory and learning.

9. • **All the skeletal system bones are one bone (fused).**
   • **All the bones of the human body are without joints.**
   The human body can't move.

10. **Hib (thigh) joint has a limited movement.**
    The lower limbs will move in one direction only.

11. **The shoulder joints become from the limited movement joints.**
    The two upper limbs will move in one direction only.

12. **The backbone consists of one long bone.**
    The human body can't bend in different directions.

13. **The absence of cartilage between vertebrae of the backbone.**
    Friction takes place between the vertebrae causing harms to the backbone.



PART 2

5 Important tables

1.

The Organ	Its position
1. The brain :	Inside the skull.
2. The two cerebral hemispheres :	In the brain.
3. The cerebellum :	At the back area of the brain below the two cerebral hemispheres.
4. The medulla oblongata :	In the brain exactly in front of the cerebellum.
5. The spinal cord :	In a channel within a series of vertebrae in the backbone.
6. The H-shaped gray matter :	In the inner part of the spinal cord.
7. The cerebral cortex :	At the outer surface of the two cerebral hemispheres.
8. Dendrites :	It extends from the cell body of the neuron.
9. Axon terminals :	At the end of the axon of the neuron.

2.

The joint	Its type
1. Skull joints.	Immovable joints.
2. Knee joint.	Slightly movable joint.
3. Elbow joint.	Slightly movable joint.
4. Shoulder joint.	Freely movable joint.
5. Thigh (hip) joint.	Freely movable joint.
6. Wrist joint.	Freely movable joint.





Comparisons

1. Compare between the brain and the spinal cord.

Points of comparison	The brain	The spinal cord
1. Definition :	It is a nerve block containing millions of nerve cells and it is the main control center in the human body.	It is a cylindrical cord from which the spinal nerves extend.
2. Location :	It is located in a bony box called skull.	It extends in a channel within a series of vertebrae in the backbone.
3. Function :	It directs and coordinates all the processes, ideas, behaviours and emotions.	- It delivers the nerve messages from the body organs to the brain and vice versa. - It is responsible for the reflex actions.

2. Compare between cerebellum and medulla oblongata.

Points of comparison	Cerebellum	Medulla oblongata
Location :	It lies at the back area of the brain below the two cerebral hemispheres.	It lies in front of the cerebellum.
Function :	It maintains the balance of the body during the movement.	It is responsible for regulating the involuntary processes of the body as : - Regulating the heartbeats. - Regulating the movement of the respiratory system parts during breathing. - Regulating the movement and functions of the digestive system.



PART 2

3. Compare between the structure of spinal cord and the structure of the two cerebral hemispheres.

Points of comparison	Spinal cord	Cerebral hemispheres
Structure :	It consists of : - Internal gray matter that has the shape of letter "H". - External white matter that surrounds the gray matter.	They consist of : - Internal white matter. - External gray matter that surrounds the white matter.

4. Compare between cranial nerves and spinal nerves.

Points of comparison	Cranial nerves	Spinal nerves
Definition :	They are nerves that emerge from the brain.	They are nerves that emerge from the spinal cord.
Number :	12 pairs.	31 pairs.

5. Compare between the central nervous system and the peripheral nervous system.

Points of comparison	Central nervous system	Peripheral nervous system
Structure :	It consists of the brain and the spinal cord.	It consists of cranial nerves and spinal nerves.
Function :	- It directs and coordinates all the processes, ideas, behaviours and emotions. - It delivers the nerve messages from the body organs to the brain and vice versa. - It is responsible for the reflexes.	It delivers the sensory information and the kinetic responses between the central nervous system and all parts of the body.



6. Compare between different types of joints.

Points of comparison	Immovable joints	Slightly movable joints	Freely movable joints
Definition :	They are the joints that don't allow any movement.	They are the joints that allow movement in one direction only.	They are the joints that allow movement in all directions.
Examples :	Joints between the bones of the skull.	- Knee joint. - Elbow joint.	- Shoulder joint. - Wrist joint. - Thigh (hip) joint.

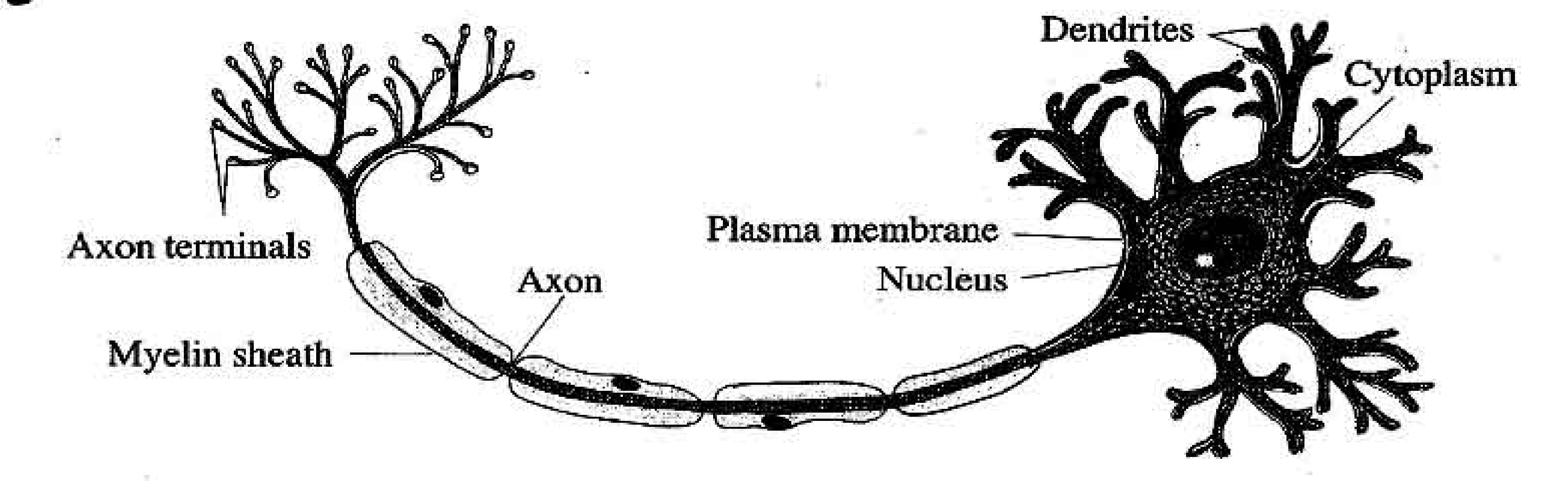
7. Compare between axial skeleton and appendicular skeleton.

Axial Skeleton	Appendicular Skeleton
It is composed of the skull, the backbone and the ribcage.	It is composed of bones of upper limbs and bones of lower limbs.

8. Compare between the upper limbs and the lower limbs in the human being.

The upper limbs	The lower limbs
– They are connected to the shoulder bones. – They are humerus bone, forearm bones and hand bones. – They allow eating drinking and holding things.	– They are connected to the pelvic bones. – They are femur bone, shaft bones and foot bones. – They allow walking, running and sitting.

Important drawings

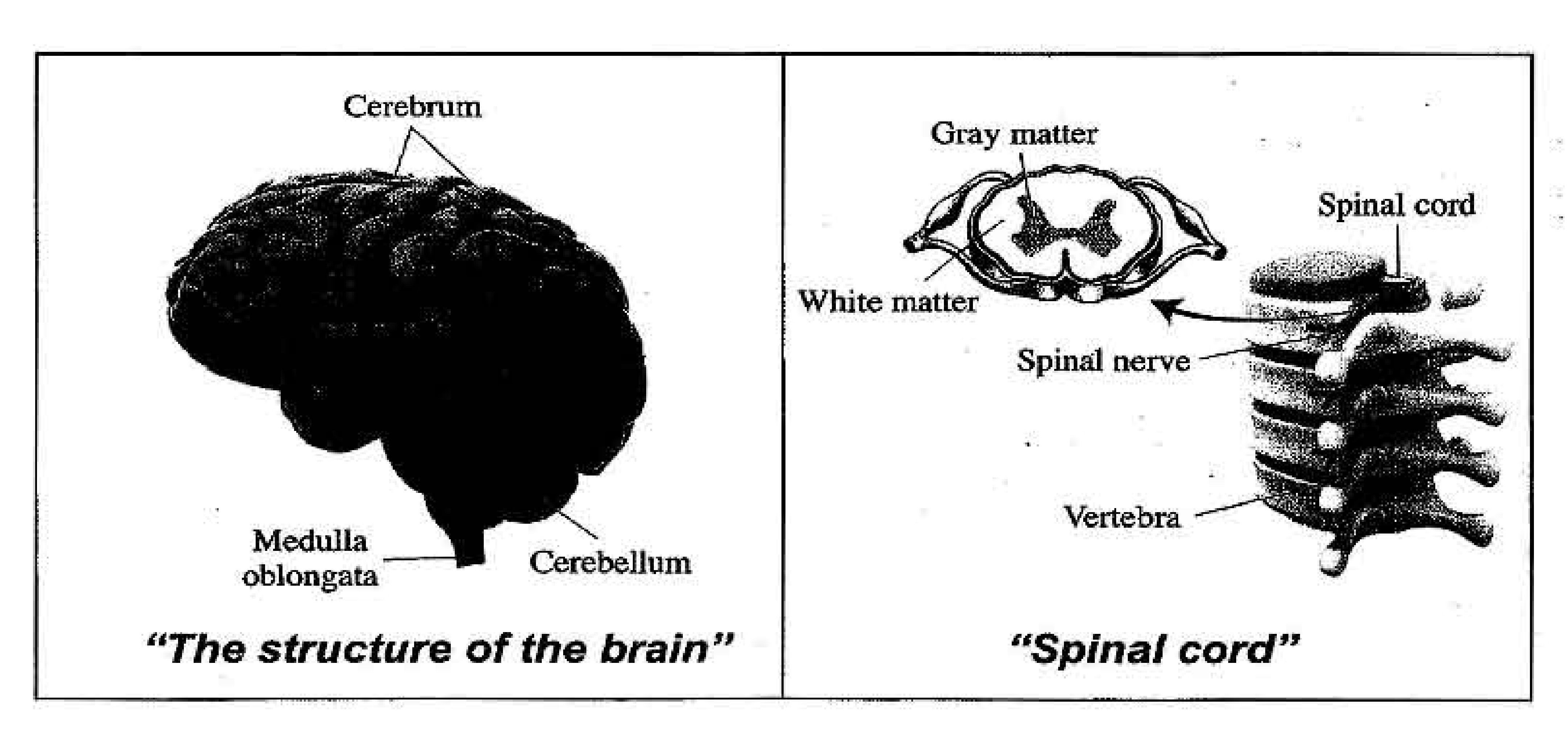


The structure of the nerve cell (neuron)



The brain
The central nervous system
The spinal cord
Cranial nerves
The peripheral nervous system
Spinal nerves

The structure of the nervous system



"The structure of the brain"

"Spinal cord"



Skull
Ribcage
Backbone

"Axial skeleton"

Shoulder bones
Humerus bone
Forearm bones
Hand bones

"Bones of upper limbs"

Pelvic bones
Femur bone
Shaft bones
Foot bones

"Bones of lower limbs"

8 Important points

- The nervous system consists of two major systems which are :
  1. Central nervous system. ***2. Peripheral nervous system.***
- The neuron consists of two main parts which are :
  1. The cell body. ***2. The axon.***
- The cell body contains **a nucleus**, **cytoplasm** and **a plasma membrane**.
- The brain of the human consists of three main parts which are :
  1. Cerebrum. ***2. Cerebellum.***
  3. Medulla oblongata.





- The outer part of the cerebrum is **a gray matter**, but the inner part is **a white matter**.
- The outer part of the spinal cord is **a white matter**, but the inner part is **a gray matter (that has the shape of letter "H")**.
- The structure of the spinal cord is **opposite to** that of the two cerebral hemispheres.

- ***Ways to maintain the human nervous system :***
  1. Reducing the intake (drinking) of the stimulating substances such as tea, coffee and others.
  2. Staying away from the tranquilizers and stimulants.
  3. Keeping away from sitting for long periods in front of computer and television to avoid the exhausting of sense organs.
  4. Giving the body a sufficient period of rest especially during sleep.
  5. Avoiding the extreme exciting situations.
  6. Staying away from the sources of pollution, because they passively affect the nervous system.
  7. Doing physical exercises.
  8. Staying away from addiction.

- **The locomotory system consists of :**
  1. The skeletal system.
  2. The muscular system.
- **The skeletal system consists of :**
  1. The axial skeleton.
  2. Appendicular skeleton.
- The backbone consists of **33 vertebrae**.
- The ribcage consists of **12 pairs** of ribs.
- In the ribcage, the first **10 pairs** of ribs are connected to the **sternum** (breast bone) anteriorly.
- Bones of upper limbs are connected to the **shoulder bones**, while the bones of lower limbs are connected to **pelvic bones**.



PART TWO

Final Exams

27 Final Exams of Governorates 2017

Final Exams of Governorates 2017

1 Cairo Governorate — The Educational Directorate

Answer the following questions :

1 [A] Complete the following statements :

1. The measuring unit of weight is ...., while the measuring unit of mass is ....
2. Copper is from .... conductors of heat.
3. Carbon dioxide molecule consists of one carbon atom linked with two .... atoms.
4. Nitrogen combines with a lighted magnesium composing .... substance.
5. The ribcage consists of .... pairs of ribs.

[B] Give reasons for :

1. Clear limewater becomes turbid when carbon dioxide passes in it.

   ....

2. Oxygen cylinders are used during climbing mountains.

   ....

2 [A] Write the scientific term of the following statements :

1. The building unit of the nervous system. (..................)
2. The amount of matter in an object. (..................)
3. The main control center in human body. (..................)
4. Gas is used in respiration and combustion processes. (..................)
5. Organ in the central nervous system responsible for the reflex action. (..................)

[B] Mention one function of :

1. The spring scale :

   ....

2. Celsius thermometer :

   ....

3. Ozone layer :

   ....

2 Part

3 **[A] Put (✓) in front of correct statements and (✗) in front of incorrect one :**

1. Oxygen gas represents 78% of the volume of the atmosphere. ( )
2. Cooking pots are made of plastic. ( )
3. Nitrogen gas is called azote which means "life gas". ( )
4. Air is from good conductors of heat. ( )
5. Oxy-acetylene flame is used in cutting and welding metals. ( )
6. Cerebellum maintains the balance of the body during movement. ( )

[B] What happens in the following cases ... ?

1. Continuous exposure the man to noise.

....

2. Increase of carbon dioxide percentage in the atmosphere.

....

4 **[A] Choose the correct answer :**

1. The lower fixed point in celsius thermometer scale represents the .... freezing point.
   a. liquids b. mercury c. water
2. Backbone consists of .... bony vertebrae.
   a. 12 b. 21 c. 33
3. From the freely movable joints is ....
   a. shoulder b. elbow c. knee
4. A weight of body is 2 Newton so its mass is equal to ....
   a. 0.2 gm b. 20 gm c. 200 gm
5. Hydrogen peroxide dissociates in the presence of manganese dioxide (as a catalyst) into ....
   a. water b. oxygen gas c. water & oxygen gas

[B] Notice the following figure of medical thermometer, then label it :

① ....
② ....
③ ....

35 36 37 38 39 40 41 42
① ② ③



2 Giza Governorate — The Educational Directorate

Answer the following questions :

1 [A] Choose the correct answer :

1. From the substances which are bad conductors of heat is ....
   a. iron b. wood c. copper
2. Which of the following gases have great percentage in atmospheric air ? ....
   a. Oxygen b. Nitrogen c. Carbon dioxide
3. The joints which allow movement in one direction only are .... joints.
   a. immovable b. slightly movable c. freely movable
4. The operation of thermometer depends on the change of .... with the change in temperature.
   a. gases volume b. liquid volume c. liquid mass
5. The ribcage in man consists of .... pairs of ribs.
   a. 10 b. 11 c. 12
6. An object whose mass is (200 gm) on Earth's surface, so its weight equal ....
   a. 2 Newton. b. 20 Newton. c. 200 Newton.

[B] What happen when ... ?

1. We get rid of soil bacteria.
   ....
2. Exhaled air passes through clear limewater.
   ....

2 [A] Complete the following statements:

1. The weight of the body on moon's surface = ... of its weight on Earth's surface.
2. Heat is a form of the forms of ....
3. Divers use .... cylinder during diving under water.
4. The centers of thinking and memory lie in ....
5. The mass is measured by .... scale.
6. Nitrogen is used in the manufacture of .... which doesn't rust.

[B] Compare between good conductors and bad conductors of heat :

Point of comparison	Good conductors of heat	Bad conductors of heat
Definition :	....	....



3 **[A] Write the scientific term :**

1. An indicator helps us to express the state of the body from point of hotness or coldness. (..................)
2. Long strips that fix muscles on bones. (..................)
3. The building unit of nervous system. (..................)
4. A force with which a body is attracted to the Earth. (..................)
5. A gas that its molecule is composed of three oxygen atoms. (..................)
6. An instrument used for measuring the temperature. (..................)

[B] Give reasons for :

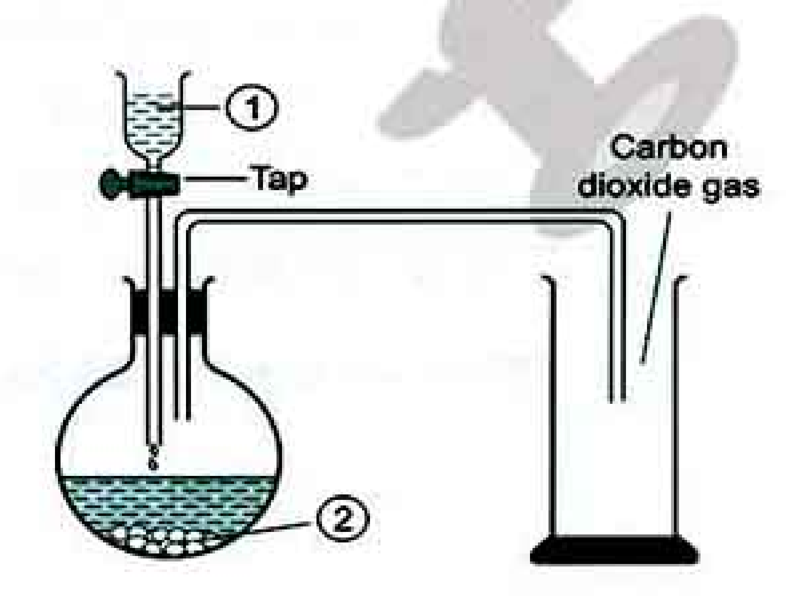
1. Damage of the medulla oblongata causes death.
....
2. Carbon dioxide is used in extinguishing some fires.
....

4 **[A] Correct the underline word in the following statements :**

1. **Weight** is a constant value and is not affected by changing the place. (..................)
2. The scale of the medical thermometer starts from 35°C to **100**°C. (..................)
3. The axon of the nerve cell is surrounded by a **gelatinous** layer. (..................)
4. The cerebellum lies at the back area of the brain **above** the two cerebral hemispheres. (..................)
5. **Hydrogen peroxide** remains without change in quantity or properties during the preparation of oxygen gas. (..................)
6. The liquid that is used in making the thermometers is **water**. (..................)

[B] In the opposite figure answer the following :

1. Number ① Is ....
2. Number ② Is ....



3 Alexandria Governorate — The Educational Directorate

Answer the following questions :

1 [A] Complete the following :

1. The mass can be measured by .... and the weight can be measured by ....
2. The neuron consists of the cell body and .... which ends by the presence of ....
3. As the mass of the planet increases, its gravity .... and that leads to .... the weight of the object.
4. Carbon dioxide is prepared in the laboratory by adding .... to the powder of ....
5. Water freezes at .... Celsius and boils at .... Celsius.

[B] Mention the following only :

1. The substance that indicates presence of carbon dioxide. (......................)
2. An example of involuntary muscle. (......................)
3. The product substance from the combination of magnesium and oxygen. (......................)

2 [A] Write the scientific term of the following :

1. The part responsible for keeping the body balance during movement. (......................)
2. The degree of hotness or coldness of a body. (......................)
3. Locations of bones meeting that allow the movement between them. (......................)
4. A gas used in filling the planes and cars tires and also contributes in composing gunpowder. (......................)

[B] Correct the underlined words :

1. In preparing oxygen from hydrogen peroxide, **Sodium hydroxide** is used as a catalyst. (......................)
2. 12 pairs of **ribs** come out from the brain. (......................)
3. **Iron** is used in manufacturing kettles that are used in houses and factories. (......................)
4. The joint of **shoulder** is one of slightly movable joints. (......................)

2 Part

3 [A] Choose the right answer from the following :

1. The mass of one litre of water equals ....
   a. 1 gm. b. 1 kg c. 100 Newton. d. 100 gm.
2. Ozone gas consists of ....
   a. One atom. b. two similar atoms.
   c. three similar atoms. d. three different atoms.
3. The gas that is used with acetylene gas in welding metals ....
   a. hydrogen. b. oxygen. c. nitrogen. d. carbon dioxide.
4. The centers of thinking and memory lies in ....
   a. the medula oblongata. b. the spinal cord.
   c. the vertebral column. d. the two cerebral hemispheres.

[B] Give reasons for the following :

1. Passing the air on the hot copper during the preparation of nitrogen in lab.
   ....
2. The ribcage surrounds the heart and the two lungs.
   ....
3. Using wood in making the handle of cooking pots.
   ....
4. Using liquids in making the thermometers.
   ....
   ....

---

4 [A] In the opposite figure that illustrates the structure of the medical thermometer :

1. Number ① is a bulb contains ....
2. Number ② is ....
3. Number ③ is .... and its function is ....
   ....
4. The thermometer scale starts from .... °C to .... °C.

[B] If the mass of a body equals 30 kg on the Earth surface. Calculate :

1. Its mass on the moon surface.
   ....
2. Its weight on the Earth :
   ....
3. Its weight on the moon.
   ....






[C] Compare between the structure of the axial skeleton and the appendicular skeleton :

Point of comparison	Axial skeleton	Appendicular skeleton
The structure	....	....

4 Kalyoubia Governorate — The Educational Directorate

Answer the following questions :

1 [A] Choose the correct answer :

1. An object whose weight on the Earth's surface is 6 Newton, so its weight on the moon's surface is .... Newton.
   a. 10 b. $\frac{1}{2}$ c. 1 d. $\frac{1}{6}$
2. All the following are good conductors of heat except ....
   a. aluminium and copper. b. iron and aluminium.
   c. copper and iron. d. glass and wood.
3. Hydrogen peroxide is used in preparing .... gas.
   a. oxygen b. hydrogen c. nitrogen d. carbon dioxide
4. .... is from the reflex action.
   a. Heartbeats
   b. Eating on feeling hungry
   c. Blinking when something gets close to the eye
   d. (a) , (b) and (c)

[B] Give reason for each of the following :

1. There is a constriction above the mercury bulb in the medical thermometer.
   ....
   ....
2. It is necessary to eat healthy food that is rich in calcium and phosphorus.
   ....
3. It is necessary to leave spaces between the railway bars.
   ....
   ....
4. The ribcage surrounds both the heart and the lungs.
   ....

2 Part

2 [A] Write the scientific term :

1. The system responsible for controlling all body systems. (............)
2. A colourless gas that is the main component of all protein compounds. (............)
3. The area where bones meet and allow the movement. (............)
4. The thermometer whose scale ranges from 35°C to 42°C. (............)

[B] Mention one function for each of the following :

1. Cerebellum : ....
2. Tendons : ....
3. The spring scale : ....
4. The ozone layer : ....

3 [A] What happens in the following cases ... ?

1. A lighted magnesium ribbon is placed in a jar filled with nitrogen gas.
....
2. Drinking big quantities of soft drinks.
....
3. All the substances that man use are good conductors of heat.
....
4. Condensation of nitrogen gas.
....

[B] Compare between mass and weight according to :

Points of comparison	Mass	Weight
1. Measuring unit :	....	....
2. Measuring device :	....	....

4 [A] Put (✓) or (✗) :

1. The liquid used in the medical thermometer is alcohol. ( )
2. The shoulder joint is a freely moveable joint. ( )
3. Cooking pots are made of plastic. ( )
4. Heat transfers from a cold object to a hot object. ( )



[B] Look at the following figure, then answer :

1. Write what each label represents on the figure :
   ① ....
   ② ....
   ③ .... gas.
2. Mention one use for the evolved gas.
   ....
   ....

5 Sharkia Governorate — The Educational Directorate

Answer the following questions :

1 [A] Complete the following statements :

1. The number of cranial nerves is .... and the number of spinal nerves is ....
2. Oxygen is produced from .... process and carbon dioxide is produced from .... process.
3. Heat transfers from the .... temperature object to the .... temperature object.
4. As the mass of the planet on which the body exits increases, the .... of the planet increases and .... of the body increases.
5. The main center of the control in your body is .... and it is found inside a bony case called ....

[B] Give reason for each of the following :

1. Leaving spaces between the railway bars.
   ....
2. Ozone gas is very important in nature.
   ....

2 [A] Write the scientific term of each of the following :

1. The main source of preparing nitrogen gas. (..............)
2. Materials that don't let heat flow through. (..............)
3. What fixes muscles to bones. (..............)
4. The gas that turns limewater turbid. (..............)
5. The building unit of nervous system. (..............)



2 Part

[B] Explain :

1. The mercury is used in manufacture of thermometers.
   a) ....
   b) ....
2. Observe the opposite figure, and write the labels :
   ① ....
   ② ....
   ③ ....

3 [A] What is the function of each of the following :

1. Hydrogen peroxide during the preparation of oxygen in the laboratory.
   ....
2. Spring scale.
   ....
3. Celsius thermometer.
   ....

[B] Choose the correct answer :

1. Among the freely movable joints are .... joints.
   a. knee b. thigh c. elbow d. skull
2. Celsius is the measuring unit of ....
   a. weight. b. temperature. c. volume. d. mass.
3. The metal that is better in conducting heat is ....
   a. aluminium. b. iron. c. copper. d. mercury.
4. The thoracic in the man consists of .... pairs of ribs.
   a. 11 b. 31 c. 12 d. 14
5. Oxygen is present in the atmosphere in gas state in form of molecules, its structure ....
   a. O_3 b. O c. O_2 d. O_4

4 [A] Correct the underlined words :

1. Calcium carbonate is used in preparation of **nitrogen** gas. (....................)
2. There is a constriction above the mercury bulb in the **Celsius thermometer**. (....................)



3. The mass of the material **decreases** after combination with oxygen. (....................)
4. **The spinal cord** controls the heartbeats. (....................)
5. Nitrogen is also called azote which means **life gas**. (....................)

[B] An object whose mass on Earth is equal to (6 Kg). Calculate :

1. Its weight on the surface of the Earth.
....
2. Its weight on the surface of the moon.
....

6 Menofia Governorate — The Educational Directorate

Answer the following questions :

1 [A] Choose the correct answer :

1. The weight is measured by .... scale.
   a. sensitive b. digital c. two arm d. spring
2. The liquid used in the Celsius thermometer is ....
   a. hydrogen peroxide. b. alcohol.
   c. water. d. mercury.
3. Which of the following is faster in conducting heat ? ....
   a. Glass. b. Aluminium. c. Copper. d. Iron.
4. One of the slightly movable joints is the .... joint.
   a. thigh b. shoulder c. wrist d. knee
5. .... is used to make the iron handle.
   a. Iron b. Copper c. Aluminium d. Plastic
6. Carbon dioxide is produced when diluted hydrochloric acid is added to the ....
   a. calcium carbonate. b. calcium oxide.
   c. calcium hydroxide. d. calcium chloride.

[B] What would happen in the following cases ... ?

1. The overuse of soft drinks.
....
2. Not leaving spaces between railway bars.
....

2 Part

2 [A] Write the scientific term of each of the following statements :

1. The measurement unit of weight which is almost equal to a mass 100 grams. (........................)
2. A flame used in cutting and welding metals. (........................)
3. The degree of hotness or coldness of a body. (........................)
4. A gas contributes in composing proteins and living tissues. (........................)
5. The phenomenon which leads to raise in the Earth's temperature and causes changes in the climate. (........................)
6. An organ connects the brain with the spinal cord and is responsible for involuntary processes. (........................)

[B] An object's mass = 30 kg on the moon's surface. Calculate :

1. Its mass on the Earth.
   ....
2. Its weight on the Earth's surface.
   ....
3. Its weight on the moon's surface.
   ....

3 [A] Correct the underlined words :

1. The internal substance of the spinal cord is the **yellow** matter. (........................)
2. The liquid used in the medical thermometer is **water**. (........................)
3. **Argon** is used in extinguishing of fires. (........................)
4. The centers of thinking and memory are located in the **medulla oblongata**. (........................)
5. Hydrogen peroxide dissociates in the presence of manganese dioxide and produces **helium** gas and water. (........................)
6. The Earth gravitational force **increases** as the body moves away from the Earth. (........................)

[B] 1. What is the name of the opposite figure ? ....

2. Write down the labels on the figure.

① ....
② ....
③ ....



4 **[A] Complete the following statements by suitable words :**

1. Materials are classified according to conducting heat into .... and ....
2. Mercury remains liquid between two degrees of temperature which are .... and ....
3. Carbon dioxide gas is converted into a liquid by .... and ....
4. The number of cranial nerves is .... pairs, while the number of spinal nerves is .... pairs.
5. The rapid union between oxygen and elements produces heat and light , it is named ...., whereas if it is slow in the presence of moisture , it is named ....
6. The .... controls the reflexes, while the cerebellum is responsible for ....

[B] Write the scientific reason of each of the following :

1. The windows in the cold countries are made of two sheets of glass with space containing air in between.
   ....
2. Nitrogen is used in filling car tires.
   ....
   ....

7 Gharbia Governorate — The Educational Directorate

Answer the following questions :

1 **[A] Complete the following statements :**

1. The scale of medical thermometer starts from .... °C and ends at .... °C.
2. The central nervous system in human consists of two main parts which are .... and ....
3. The main idea to make a thermometer is the change in .... of the liquid by changing ....
4. During photosynthesis process in green plants .... gas is produced, while burning of organic materials produces .... gas.
5. From measuring devices of mass is ...., whereas weight is measured by using ....

2 Part

[B] Give reasons for each of the following :

1. Aluminium and stainless steel are used in making cooking pots.
....

2. Nitrogen is used to store petroleum and some flammable materials.
....

3. Increased ratio of carbon dioxide gas in the atmosphere in recent years.
....

2 [A] Write the scientific term :

1. A gas exists in the atmosphere that protects Earth from harmful radiation coming from the Sun. (..................)
2. An instrument used for measuring the temperature of liquids. (..................)
3. The skeleton which includes the upper and lower limbs. (..................)
4. A form of energy transfers from an object to another if they differ in temperature. (..................)
5. A gas combines with oxygen to produce a flame whose temperature is sufficient to melt metals. (..................)

[B] An object whose mass on Earth equals 30 kg. Calculate :

1. Its weight on Earth : ....
2. Its weight on the moon : ....
3. Its mass on the moon : ....

3 [A] Choose the correct answer :

1. Addiction passively affects the nervous system causing ....
   a. muscle stress. b. sprains. c. sleepless.
2. The gas which is used in making dry ice is .... gas.
   a. carbon dioxide b. oxygen c. nitrogen
3. The weight of a person in a balloon at certain height from Earth's surface equals 70 Newton so, the weight of the person on Earth's surface is ....
   a. 69 Newton. b. 70 Newton. c. 71 Newton.
4. All of the following are properties of mercury as a thermometical substance except ....
   a. good conductor of heat.
   b. give limited extent to measure temperature.
   c. not adhere to the walls of capillary tube.

5. Magnesium ribbon keeps burning inside a cylinder full of carbon dioxide gas forming ....
   a. magnesium oxide and coal. b. magnesium oxide and oxygen.
   c. magnesium oxide and carbon dioxide.

[B] What would happen in the following cases ?

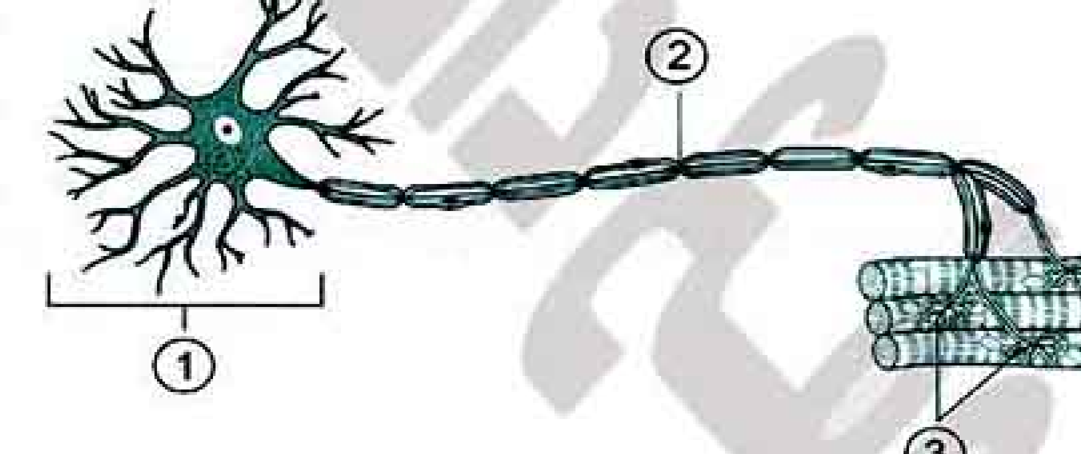
1. The mercury bulb of medical thermometer is broken and mercury is spilled inside the mouth of the person using it.
   ....
2. The hand suddenly touches a hot object.
   ....
3. Not leaving spaces between railway bars.
   ....

4 [A] Correct the underlined words in the following :

1. **Medulla oblongata** maintains the body balance during motion. (.....................)
2. **Carbon dioxide gas** is used in filling car tires. (.....................)
3. Oxygen molecule consists of **three** oxygen atoms. (.....................)
4. Aluminium conducts heat faster than **copper**. (.....................)
5. Carbon dioxide gas reacts with clear limewater forming white precipitate of **calcium hydroxide** which is insoluble in water. (.....................)

[B] Look at the opposite figure, then label the numbers.

① ....
② ....
③ ....





8 Dakahlia Governorate — The Educational Directorate

Answer the following questions :

1 [A] Complete the following statements :

1. The device which is used to measure the temperature is ....
2. The central nervous system is composed of .... and ....



3. Preparation of oxygen in the laboratory from .... with manganese dioxide.
4. A body mass on the Earth's surface is 5 kg., the same body mass on the moon's surface is ....
5. We must avoid jumping from high places to avoid .... in our locomotory system.

[B] Mention one function or importance of each of the following :

1. Celsius thermometer.
....
2. Dry ice.
....
3. Hot copper in nitrogen preparation experiment.
....

2 [A] Write the scientific term of each of the following :

1. The amount of matter that the body contains. (....................)
2. Types of muscles that work automatically and we can't control there movement. (....................)
3. A gas used in making soft drinks. (....................)
4. A part of brain which regulates the involuntary processes of the body. (....................)
5. A gas produced from green plants during photosynthesis process. (....................)

[B] Give reasons for each of the following :

1. Aluminium is used in making cooking pots.
....
2. Presence of cartilages between the vertebrae of the backbone.
....
3. Nitrogen is recently used in filling car tiers.
....

3 [A] Choose the correct answer :

1. From the materials which are good conductors of heat ....
   a. plastic. b. air. c. wood. d. mercury.



2. A part of the nervous system responsible for reflex actions ....
   a. cerebrum.
   b. cerebellum.
   c. medulla oblongata.
   d. spinal cord.
3. From the properties of oxygen, it is .... soluble in water.
   a. scarcely
   b. rapidly
   c. non
   d. (a) , (b) and (c)
4. If an object's weight on the Earth's surface is (6) Newton, its weight on the moon's surface will be ....
   a. 6 Newton.
   b. 60 Newton.
   c. $\frac{1}{6}$ Newton.
   d. 1 Newton.
5. Carbon dioxide turbids the clear limewater due to formation of ....
   a. calcium oxide.
   b. calcium carbonate.
   c. calcium hydroxide.
   d. carbon.

[B] What would happen in the following cases ... ?

1. The reaction between nitrogen with oxygen by lightening.
   ....
2. The constriction is not found in the capillary tube of the medical thermometer.
   ....
3. All human bones are fixed with each other.
   ....

4 [A] Put (✗) or (✓) in front of the each of the following statements :

1. The weight is the force with which a body is attracted to the Earth. (   )
2. Carbon dioxide molecule consists of one oxygen atom linked with two carbon atoms. (   )
3. The medical thermometer scale starts from 32°C to 45°C. (   )
4. Ozone gas consists of three oxygen atoms. (   )
5. One kilogram equals 1000 grams which equal one litter of distilled water. (   )
6. Humerus bone and forearm bones are from parts of lower limbs. (   )

[B] Write two ways only to maintain our nervous system.

1. ....
2. ....



2
Part

9 Ismailia Governorate — The Educational Directorate

Answer the following questions :

1 [A] Choose the correct answer :

1. The Newton is nearly equals the weight of a body its mass is .... gm.
   a. 10 b. 100 c. 1000 d. 10000
2. From the immovable joints ....
   a. shoulder joint. b. wrist joint. c. elbow joint. d. skull joints.
3. When oxygen unites rapidly with elements and produces heat and light, this union is called ....
   a. oxidation. b. burning. c. neutralization. d. decomposition.
4. Determine which of the following materials is faster in conducting heat ? ....
   a. Aluminium. b. Iron. c. Copper. d. Glass.
5. The .... gas contributes in the composition of soil fertilizers.
   a. oxygen b. carbon dioxide c. nitrogen d. chlorine

[B] A piece of rock is placed in a pan of double pans balance, the sum of masses which are placed in the other pan is 300 gm. to make balance. Answer the following :

1. What is the mass of the piece of rock ?
   ....
2. What is the weight of the piece of rock on the Earth's surface?
   ....
3. What is the effect of changing the place on both mass and weight of the rock piece ?
   ....
   ....

2 [A] Put (✓) or (✗) :

1. Celsius thermometer is used in measuring the human body temperature. ( )
2. The cerebellum is responsible for keeping the body balance during movement. ( )
3. The cooking pots and kettles are made up of plastic. ( )



4. Mercury is used in thermometers because it is a regular expanding material. ( )
5. Mass is the force of Earth's gravity to a body. ( )
6. Bones of the lower limbs are connected to the shoulder bones. ( )

[B] What happens when ... ?

1. Putting a glowing magnesium ribbon in a jar containing carbon dioxide.
....
....
2. Your hand suddenly touches a hot body.
....

3 [A] Write the scientific term of each of the following :

1. A type of muscles that work automatically and you cannot control. (..................)
2. Materials that do not let heat flow through. (..................)
3. A flame used in cutting and welding metals. (..................)
4. The main control center in the human body. (..................)

[B] What is the role of each of the following :

1. Yeast in making bread.
....
2. The ozone layer in the atmosphere.
....

[C] Look at the opposite figure, then answer :

1. What is the name of this figure ? ....
2. Write what is indicated by numbers :
① ....
② ....
③ ....

4 [A] Complete the following statements with suitable words :

1. The mass is measured by .... scale, while the weight is measured by .... scale.
2. The oxygen gas is produced plentifully from .... during .... process.
3. Heat is a form of .... that transfers from the .... temperature object to the low temperature object.

4. Muscles are fixed to bones by ...., while .... are found between vertebrae of backbone to prevent their friction.
5. The peripheral nervous system consists of .... of cranial nerves and .... of spinal nerves.

[B] Give reasons for each of the following :

1. Heavy woolen clothes are used in winter.
....
2. The bridges' pillars made of iron are isolated from moisture with paints.
....
3. Reducing the intake of stimulating substances such as coffee.
....

10 Suez Governorate — The Educational Directorate

Answer the following questions :

1 Complete the following sentences :

1. All metals are .... conductors of heat.
2. Mass is constant and does not change with the change of ....
3. The heat is a form of the forms of ....
4. The percentage of carbon dioxide gas in atmosphere equals .... it has the symbol of ....
5. The brain consists of cerebrum, ... and ....
6. The backbone consists of .... vertebrae.

2 [A] Put (✓) or (✗) :

1. The digital balance is used in measuring weight. ( )
2. Copper is considered from bad conductors of heat. ( )
3. Celsius thermometer is used to measure human temperature. ( )
4. Nitrogen is called azote and its meaning gas of life. ( )
5. The spinal cord is responsible for reflex actions in human body. ( )
6. The knee joint is an immovable joints. ( )

[B] Give reason for the following statements :

1. The decrease of green areas harm the environment.
....

2. The cooking pots are made of aluminium, while its handles are made of plastic.

....

....

3 [A] Choose the correct answer from the following :-

1. The gas which is used with acetylene in welding metals is .... gas.
   a. oxygen b. nitrogen c. hydrogen d. carbon dioxide
2. The weight of the body on Earth's surface is 6 Newton, so its weight on moon's surface equals ....
   a. 1 kg. b. 1 Newton c. 6 kg. d. 6 Newton
3. The thoracic cage in the man consists of .... pairs of ribs.
   a. 10 b. 11 c. 12 d. 13
4. The part which is responsible for keeping human body balance is ....
   a. two cerebral hemispheres. b. cerebellum.
   c. medulla oblongata. d. spinal cord.
5. Hydrogen peroxide decomposes in presence of manganese dioxide to ....
   a. oxygen and hydrogen. b. oxygen and water.
   c. hydrogen and water. d. hydrogen and manganese.
6. Oxygen is present in the atmosphere in gas state in form of molecules its structure ....
   a. O b. O_2 c. O_3 d. O_4

[B] A body its mass is 10 kg. Calculate its weight of an earth's surface.

....

....

4 [A] Look at the opposite figure, then answer :

1. Write the name of figure.

....

2. Label the figure :

① ....

② ....

③ ....

[B] Correct the underlined words :

1. Different metals transfer heat by **the same rate**. (....................)
2. **Nitrogen** gas is used in extinguishing fires. (....................)
3. The molecule of ozone gas consists of **four** oxygen atoms. (....................)
4. **Cartilages** link bones with muscles. (....................)

11 Port Said Governorate — The Educational Directorate

Answer the following questions :

1 [A] Complete the following statements :

1. The force of Earth's attraction to a body is called .... and is measured in a unit called ....
2. Plastic is a .... conductor of heat and is used in making ....
3. During the preparation of .... gas, hot copper combines with the .... found in the air.
4. The medical thermometer scale starts from .... degree Celsius until 42 degree Celsius and every degree is divided into ....
5. The human axial skeleton consists of ...., ribcage and ....
6. .... gas turbids limewater because of the formation of .... which doesn't dissolve in water.

[B] Answer the following question :

Which of the following two thermometers has a constriction :
medical or Celsius thermometer and why it has this constriction ?
....
....

2 [A] Correct the underlined words :

1. **Water** is a regular expanding material. (....................)
2. **Nitrogen** gas protects the Earth from harmful radiations. (....................)
3. The operation of thermometer depends on the change of the **density** of the liquid inside with the change in temperature. (....................)
4. In the human nervous system, **medulla oblongata** is responsible for receiving nerve impulses from sense organs and sending responses to these impulses. (....................)

[B] If the weight of a certain body on Earth's surface is 300 Newton. Calculate its :

1. Mass.

....

2. Weight on Moon's surface.

....

[C] Explain each of the following :

1. Pungent odour evolves as a result of adding water to the product of burning magnesium in nitrogen.

....

2. There are cartilages between vertebrae of the backbone.

....

3 [A] Choose the correct answer :

1. Nitrogen is used in making ....
   a. dry ice. b. fertilizers. c. soft drinks.
2. The weight of a human in a balloon away from the Earth's surface will not be equal to his weight on Earth's surface because of the .... in the effect of Earth's gravitational force as we go away from Earth's surface.
   a. decrease b. stability c. increase
3. The muscles of the .... are voluntary muscles.
   a. heart b. urinary bladder c. trunk
4. One of the properties of carbon dioxide is being ....
   a. heavier than air. b. lighter than air. c. scarcely soluble in water.

[B] Compare between cranial nerves and spinal nerves, in terms of :

Points of comparison	Cranial nerves	Spinal nerves
1. The place where they emerge from :	....	....
2. Their numbers :	....	....

[C] What would happen in each of the following cases ? And why ?

1. The mass of cleansing wire after burning.

....

....



2. Making the handle of a kettle from copper.

....

....

4 **[A] Write the scientific term of each of the following :**

1. A gas is molecule that consists of two atoms of oxygen and one atom of carbon. (....................)
2. An indicator that helps us to express the degree of hotness of coldness of a body. (....................)
3. The location where two bones meet together in the human body. (....................)
4. A gas prepared by using hydrogen peroxide. (....................)

[B] Mention one function of :

The balance scale :

....

....

[C] Examine the opposite figure , then answer the following questions :

1. Write the labels on the drawing :

① ....

② ....

③ ....

④ ....

2. The opposite drawing represents

....

12 Damietta Governorate — The Educational Directorate

Answer the following questions :

1 **[A] Complete the following statements :**

1. The .... is used in measuring the temperature of liquids, whereas the .... is used in measuring the temperature of the human body.
2. Water consists of united of one atom of .... with two .... atoms.



3. The human skeletal system consists of .... and ....
4. Mass is measured by using .... and the measurement unit of the weight is ....

[B] Correct the following statements :

1. The skull joints are from slightly movable joints.
....
2. When the mass of an object on Earth's surface equals 6 kilogram, so its weight on moon's surface is 60 newton.
....
3. Aluminium conducts heat faster than copper and iron.
....
4. The atmosphere protects the Earth by absorbing the gases coming from outer space.
....

2 [A] Choose the correct answer :

1. From bad conductors of heat are ....
   a. iron and aluminium b. copper and glass
   c. glass and wood d. aluminium and copper
2. The scientist who discovers the nitrogen gas is ....
   a. Anders Celsius b. Joseph priestley
   c. Daniel Rutherford d. Antoine Lavoisier
3. All the following from the components of central nervous system except ....
   a. spinal nerves. b. two cerebral hemispheres.
   c. spinal cord. d. medulla oblongata.
4. When the exhaled air passes through clear limewater it turbids due to the formation of ....
   a. calcium carbonate. b. calcium oxide.
   c. calcium hydroxide. d. calcium sulphate.
5. The measuring device of the weight is ....
   a. sensitive scale b. two arms scale
   c. the spring scale d. digital scale
6. .... fix muscles with bones.
   a. Tendons b. Joints
   c. Muscular fibers d. (a) and (b).



[B] What happens in the following cases ?

1. The over use of stimulation substances.

....

....

2. The percentage of carbon dioxide gas increases in the atmospheric air.

....

....

3 [A] Write the scientific term of the following statements :

1. The amount of matter that the body contains. (....................)
2. Spontaneous response of the body to different stimuli. (....................)
3. A gas that is prepared from hydrogen peroxide. (....................)
4. Type of muscles act spontaneously and cannot be controlled. (....................)
5. It is the degree of hotness or coldness of a body. (....................)
6. A flame used in cutting and welding metals. (....................)

[B] Look at the opposite figure, then answer the questions :

1. This figure indicates the structure of ....
2. Label the points as indicated by the figures :
   ① ....
   ② ....
   ③ ....

4 [A] Give reasons for the following statements :

1. The handles of cooking pots are made of wood or plastic, while the cooking pots are made of aluminium.

....

....

2. During preparation of nitrogen gas in laboratory, air is passed in potassium hydroxide solution and over a hot copper.

....

....

3. The weight of the body differs according to the planet where the object exists.

....

....

[B] Mention one function of :

1. The constriction above the bulb in the medical thermometer.

....

2. The two cerebral hemispheres.

....

13 Kafr El-Sheikh Governorate — The Educational Directorate

Answer the following questions :

1 [A] Write a scientific term :

1. Gas increase in its percentage in air leads to the suffocation of living organisms. (....................)
2. The amount of matter in an object. (....................)
3. It consists of the bones of upper and lower limbs. (....................)
4. It is the degree of hotness or coldness of a body. (....................)

[B] Look at the following figures, then answer the following questions :

1. Figure (a) represents the .... which is used to measure ....

....

2. Figure (b) represents the .... which its function is ....

....

[C] Mention :

1. The importance of manganese dioxide in the preparation of oxygen.

....

2. The function of the cerebellum.

....

2 [A] Choose the correct answer :

1. Limewater is ....
   a. calcium carbonate. b. calcium oxide.
   c. calcium hydroxide. d. calcium sulphate.



2. From reflex actions ....

a. heartbeats. b. eating when hungry.

c. blinking when something gets close to the eye.

d. all the previous.

3. The main idea to make a thermometer is changing the .... of the liquid according to changing the temperature.

a. volume b. density c. mass d. weight

4. The Newton is nearly equals the weight of a body its mass is ....

a. 10 g. b. 100 g. c. 1000 g. d. 10000 g.

[B] Give reason for each of the following :

1. Oxygen is collected by downward displacement of water.

....

2. The handles of cooking utensils are made of wood or plastics.

....

[C] Compare between :

Points of Comparison	Immovable joints	Freely movable joints
Definition :	....	....
Example :	....	....

3 [A] Complete the following statements :

1. Cerebral hemispheres is the largest part of the brain, it consists of two halves separated by .... and attached to each other through ....
2. The main component in protein is .... which is known as ....
3. The movement is generated by the ability of .... cells to contract and relax.
4. The scale of medical thermometer starts from .... °C to .... °C.
5. As the mass of the planet on which the object exists increases, the object's .... increases.

[B] Correct the underlined words :

1. The used liquid in the medical thermometer is <u>water</u>. (.....................)
2. Ozone molecule is composed of <u>two</u> atoms of oxygen. (.....................)

3. **Muscles** prevent the friction between vertebrae of backbone during movement. (........................)

4. Carbon dioxide is prepared in the laboratory from the reaction between hydrochloric acid and **copper sulphate**. (........................)

4 **[A] Select in column (B) the appropriate in column (A) :**

(A)	(B)
1. Potassium hydroxide solution	a. 12 pairs of nerves.
2. Nitrogen gas	b. It is used to absorb carbon dioxide when preparing nitrogen in the laboratory from the air.
3. Cranial nerves	c. It is used in filling car tires.
	d. Regulating heartbeats

1. .... 2. .... 3. ....

[B] Put (✓) in front of the correct statements and (✗) in front of the false ones :

1. Oxy-acetylene flame is used in cutting and welding metals. ( )
2. The medulla oblongata delivers nerve messages from the body organs to the brain and vice versa. ( )
3. The mass of materials decreases after combination with oxygen. ( )

[C] Look at the figure in front of you and, then answer for the following :

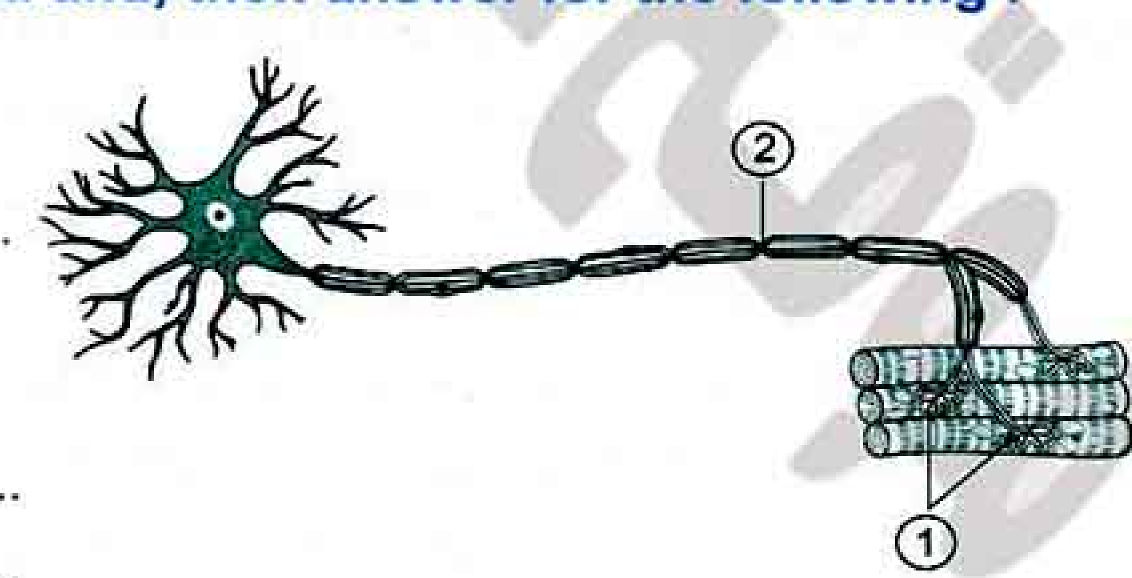
1. What the name of the opposite figure ?

....

2. Write the name of labels ① and ②

① ....

② ....



14 El-Behiera Governorate — The Educational Directorate

Answer the following questions :

1 [A] Complete the following statements :

1. Oxygen gas is prepared from .... in presence of ....
2. The number of vertebrae of vertebral column in human body is .... and the number of spinal nerves is .... pairs.
3. .... is used in measuring temperature of different liquids, whereas .... is used in measuring the temperature of the human body.
4. The main center of the control in your body is .... and it's found inside a bony case called ....
5. The water is freezed at .... and boiled at ....

[B] Fill in the following table :

Points of Comparison	Mass	Weight
Definition :	....	....
Effect of different places :	....	....
Direction :	....	....

2 [A] Write the scientific term of each of the following statements :

1. An organ responsible for the reflex actions of the body. (.....................)
2. A gas used as an inactive material in the tanks of liquefied explosives such as petroleum. (.....................)
3. An indicator helps in expressing the state of the body from the point of hotness and coldness. (.....................)
4. A gas can be prepared from adding dilute hydrochloric acid to calcium carbonate powder. (.....................)
5. Long strips that fix muscles on bones. (.....................)
6. Materials are used to make handles of cooking pots. (.....................)

[B] Mention one function of :

1. Oxy-acetylene flame.

....

2. The constriction in the capillary tube in the clinical thermometer.

....

3 [A] Choose the correct answer :

1. When a glowing magnesium ribbon is placed in a jar containing carbon dioxide on the walls of the jar, the element formed is ....
   a. magnesium. b. carbon. c. nitrogen.
2. Myelin sheath surrounds the ....
   a. nerve cell axon. b. cerebellum. c. spinal cord.
3. Which of the following is faster in conducting heat ? ....
   a. Aluminium. b. Iron. c. Copper.
4. Which of the following gasses have great percentage in atmospheric air ? ....
   a. Oxygen. b. Nitrogen. c. Carbon dioxide.
5. The Newton is nearly equals weight of a body its mass .... gm.
   a. 10 b. 100 c. 1000

[B] Give reasons for each the following statements :

1. Nitrogen is used in filling car tires.

....

2. The necessary of eating healthy food rich in calcium.

....

3. Clear limewater becomes turbid when carbon dioxide passes in it.

....

4 [A] What would happen in each of the following cases ... ?

1. Adding the yeast to dough on making bread.

....

....

2. Nitrogen is not present in the atmospheric air.

....

....



3. A body moves away from the center of the Earth.

....

[B] Mention :

1. Why is mercury preferred in making a thermometers ? (4 reasons)
   ① ....
   ② ....
   ③ ....
   ④ ....
2. Three ways of maintaining the human nervous system .
   ① ....
   ② ....
   ③ ....
3. The name of bones in lower limbs as on figure.
   ① ....
   ② ....
   ③ ....

15 Fayoum Governorate — The Educational Directorate

Answer the following questions :

1 [A] Complete the following statements :

1. The measuring unit of mass is ...., whereas the measuring unit of weight is ....
2. The main center of the control in your body is .... and it is found inside a bony box called ....
3. The oxygen gas is produced plentifully from .... during .... process.

[B] Mention one function of each of the following :

1. Ribcage.

....

2. The oxy-acetylene flame.

....

2 **[A] Choose the correct answer :**

1. Which of the following is faster in conducting heat ? ....
   a. Iron. b. Copper. c. Aluminium. d. Wood.
2. Which of the following joints is limited movement ? ....
   a. Shoulder. b. Wrist. c. Elbow. d. Thigh.
3. If the body weight on earth's surface equals 6 Newton, its weight on moon's surface equals ....
   a. 1 kgm. b. 1 Newton. c. 6 kgm. d. 6 Newton.
4. Which of the following gases has great percentage in atmospheric air ? ....
   a. Oxygen. b. Nitrogen. c. Ozone. d. Carbon dioxide.
5. Which of the following is responsible for keeping the body balance ? ....
   a. Medulla oblongata. b. Two cerebral hemispheres.
   c. Spinal cord. d. Cerebellum.

[B] What would happen in the following cases ... ?

1. A nail wetted with water is exposed several days to humid air.
   ....
2. The over take of stimulating substances.
   ....
   ....

3 **[A] Correct the underlined words :**

1. **The weight** is constant and does not change from one place to another. (...............)
2. The axon of the nerve cell is surrounded by **gelatinous** layer. (...............)
3. The liquid used in the thermometer is **the alcohol**. (...............)
4. Oxygen gas is prepared from hydrogen peroxide dissociates in the presence of **carbon dioxide gas**. (...............)
5. From the brain **(10) pairs** of cranial nerves come out. (...............)

[B] Give reasons for the following :

1. Nitrogen is collected by the displacement of water downward during its preparation in the laboratory.
   ....
2. In the clinical thermometer there is a constriction above mercury reservoir.
   ....

4 [A] Write the scientific term of the following :

1. The attraction force of the Earth to the body. (....................)
2. A gas molecules consists of three atoms of oxygen. (....................)
3. The substances that do not allow heat to pass through. (....................)
4. A gas used in the storage of petroleum and some inflammable substances. (....................)
5. An organ responsible for the reflex actions of the body. (....................)

[B] Look at the opposite figure, then answer :

1. Write what represents each label on the figure :
   – Substance ⓐ : ....
   – Liquid ⓑ : ....
2. Mention two uses of carbon dioxide gas :
   ① ....
   ② ....

16 Beni-Suef Governorate — The Educational Directorate

Answer the following questions :

1 Complete the following statements :

1. Carbon dioxide gas converts into liquid by .... and ....
2. Balance scale is used to measure ...., whereas .... scale is used to measure weight.
3. Temperature is the degree of .... or .... of a body.
4. The neuron consists of two main parts which are .... and ....

2 Give reasons for :

1. Damage of medulla oblongata causes death.
   ....
2. Yeast is added to dough on making bread.
   ....
   ....
3. Gastrointestinal tract muscles are involuntary muscles.
   ....
4. Nitrogen gas is used in filling car tires.
   ....

3 [A] Choose the correct answer :

1. From the substances which are bad conductors of heat ....
   a. iron. b. aluminium. c. air. d. copper.
2. If the body weight is 40 Newton, so its mass equals ....
   a. 4 kg. b. 400 kg. c. 40 kg. d. 4000 kg.
3. Joints which allow movements in one direction only are .... joints.
   a. slightly movable b. immovable c. freely movable
4. Mercury remains liquid between two degree temperature .... °C
   a. – 39 : 357 b. 39 : – 357 c. zero : 100

[B] Write the scientific term of each of the following statements :

1. Automatic response of the body to different stimuli. (..................)
2. Long strips in the muscles fix it into bones. (..................)
3. Liquid used in making thermometers. (..................)
4. The force with which a body is attracted to the Earth and it always towards the center of the Earth. (..................)

4 [A] Examine the following figure and complete :

① ....
② ....
③ ....
④ The function of number. ② is ....
....

[B] What are the differences between oxidation and burning ?

Points of Comparison	Oxidation	Burning
1. Definition :	....	....
2. Example :	....	....





17 El-Minia Governorate — The Educational Directorate

Answer the following questions :

1 Complete the following statements :

1. The mass is measured by using ...., while the measurement unit of weight is ....
2. Nitrogen represents ...., while oxygen represents .... of the volume of the atmosphere.
3. The number of spinal nerves is ....
4. A weight of an object can be measured by the ....
5. Oxygen is prepared from .... in presence of ....

2 Write the scientific term of each of the following statements :

1. The location of bones touch and allow moving. (........................)
2. Gas is produced according to the availability of green plants. (........................)
3. A tool used to measure the temperature of the human body. (........................)
4. The amount of matter in an object. (........................)

3 [A] What happens when ... ?

1. Insert a lighted magnesium ribbon in cylinder filled with nitrogen gas.
....
2. When carbon dioxide gas is passed in limewater.
....
....

[B] Give reasons for each of the following :

1. Cooking pots are made of aluminium, while its handles are made of plastic or wood.
....
....
2. Ozone gas is very important in nature.
....
....
3. The infection of medulla oblongata lead to death.
....
....



4 **[A] Notice the following figure and write down the labels on the figure :**

1. Gas ⓐ is ....
2. Substance ⓑ is ....
3. Liquid ⓒ is ....

[B] If an object's mass = 30 kg. on Earth. Calculate :

1. Its weight on the Earth.

....

2. Its weight on the Moon.

....

[C] Put (✓) or (✗) in front of the following statements :

1. Heat transfers from a cold object to a hot object. ( )
2. Nitrogen is used to make stainless steel. ( )
3. Mercury is good conductor of heat. ( )

18 Assiut Governorate — The Educational Directorate

Answer the following questions :

1 **Complete the following ststements :**

1. The weight is measured in .... unit, while the mass is measured in .... unit.
2. .... gas is used in composing gunpowder, while .... gas is used in welding metals.
3. The main center of the control in your body is .... and it is found inside a bony case called ....
4. The heat is a form of the forms of ....
5. The number of cranial nerves in human body is .... pairs of nerves.

2 **[A] Choose the correct answer :**

1. The planet on which the body weight equals 6 times as its weight on the moon is ....
   a. Earth. b. Mars. c. Jupiter.

2 Part

2. From the examples of substances which are good conductor of heat ....

a. glass. b. iron. c. wood.

3. The nerve cell body consists of ....

a. nucleus. b. cytoplasm and plasma membrane.

c. all the previous.

4. A gas can be prepared by using calcium carbonate powder and dilute hydrochloric acid is ....

a. oxygen. b. hydrogen. c. carbon dioxide.

5. The weight of a body its mass 10 kg. on Earth surface nearly equals ....

a. 10 Newton. b. 100 Newton. c. 1000 Newton.

6. Oxygen gas represents percentage .... of the Earth atmosphere.

a. 21% b. 78% c. 89%

[B] Mention one function of the following :

1. The joints.

....

2. The ozone layer.

....

3 [A] Write the scientific term of the following statements :

1. A gas is used in manufacture of soft drinks. (..........................)
2. Ligaments ties muscles with bones. (..........................)
3. The amount of matter that the body contains. (..........................)
4. A tool used in measuring the temperature of liquid substances. (..........................)

[B] Join from column (A) what is suitable from column (B) :

(A)	(B)
1. Copper	a. is a bad conductor of heat.
2. Plastic	b. conducts heat faster than aluminium.
3. Mercury	c. is a liquid used in sterilizing of thermometers before usage.
4. Alcohol	d. is used in manufacture of fertilizers.
	e. is a liquid used in manufacture of thermometers.

1. .... 2. .... 3. .... 4. ....

4 **[A] Notice the following figure for the spinal cord and write down the labels on the figure :**

① ....

② ....

[B] Give reasons for the following :

1. Cooking utensils (pots) are made of aluminium.

....

2. Nitrogen gas is used in filling cars and aerplanes tires.

....

[C] What would happen in the following cases ?

1. A nail from iron wetted with water is exposed several days to humid air.

....

2. There is no a constriction above mercury reservoir (the bulb) in the medical thermometer.

....

19 Sohag Governorate — The Educational Directorate

Answer the following questions :

1 **[A] Choose the correct answer :**

1. Which of the following is from the slightly movable joints ? .... joint.
   a. Elbow b. Thigh c. Wrist d. Shoulder
2. When an object's mass on the moon equals 50 kg. then its mass on the Earth should equal .... kg.
   a. 50 b. 100 c. 200 d. 500
3. When a lighted magnesium ribbon is placed in a jar containing carbon dioxide, on the wall of jar the element formed is ....
   a. oxygen. b. nitrogen. c. carbon. d. magnesium.
4. All of the following are materials that conduct heat except ....
   a. iron. b. copper. c. aluminium. d. plastic.
5. Nitrogen is used in manufacture of ....
   a. fire extinguisher. b. soft drink. c. fertilizers. d. dry ice.

2 Part

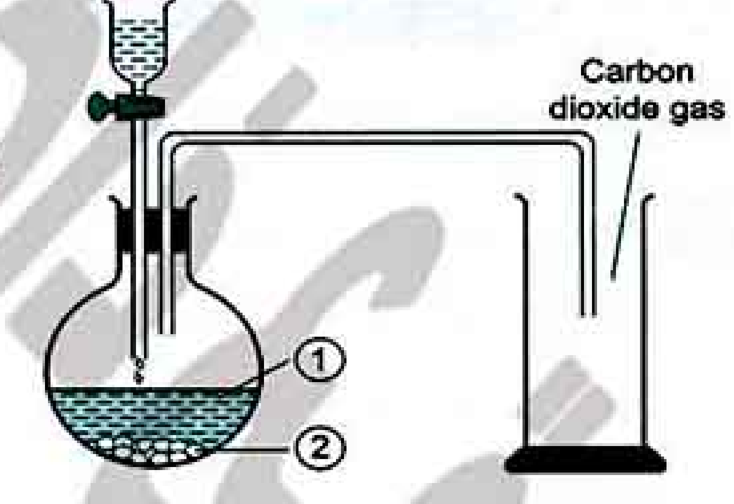
[B] What would happen in the following cases ... ?

1. A nail wetted with water is exposed for a long period to humid air.
....
2. The over intake of stimulating substances such as coffee and tea.
....
....
3. There is no constriction above the bulb of mercury in the medical thermometer.
....
....

2 [A] Write the scientific term of each of the following statements :

1. A chemical compound dissociates in the presence of manganese dioxide into water and oxygen. (..........................)
2. A tool used for measuring the objects weight. (..........................)
3. The automatic involuntary response of the body when it is exposed to an external stimuli. (..........................)
4. Materials that let heat flow through. (..........................)
5. A gas used in the storage of petroleum and some inflammable substances. (..........................)

[B] Look at the opposite figure, then answer the questions :



1. Write what each number refers to on the figure :
   – Liquid ① is ....
   – Material ② is ....
2. How the gas is collected ? And why ?
....
....

3 [A] Complete the following statements :

1. It's necessary to eat healthy food rich in calcium and phosphorus to prevent .... diseases.
2. .... is the gas which is called azote that means "lifeless" because it does not help in burning.
3. The number of the spinal nerves is ...., where as the number of the cranial nerves is ....
4. The medical thermometer is used to ...., where as the celsius thermometer is used to ....

[B] An object whose mass on Earth is equal 12 kg. Calculate :

1. Its weight on the surface of the Earth.
....
2. Its weight on the surface of the moon.
....

4 [A] Give reasons for the following :

1. The heart and lungs are surrounded by ribcage.
....
2. Ozone layer has a great importance in the life of creatures on the Earth surface.
....
3. The weight of the body on Earth's surface differs from its weight on another planet.
....
4. Air is used in making insulating glass windows.
....

[B] Correct the underlined words :

1. An example for the involuntary muscles is the **face muscles**. (..................)
2. In respiration and combustion, **carbon dioxide** is consumed. (..................)
3. **Iron** is considered the fastest metal in conducting heat. (..................)
4. The centers of thinking and concentration lie in **medulla oblongata**. (..................)

20 Qena Governorate — The Educational Directorate

Answer the following questions :

1 [A] Complete the following statements :

1. Oxygen gas is prepared from .... in presence of ....
2. Mass is a constant amount and doesn't affect by changing ....
3. .... thermometer is used to measure the temperature of water.
4. The nervous system consists of two main systems which are .... and ....

[B] Mention one use (importance) for each of the following :

1. Oxy-acetylene flame.
....
2. Cartilages between vertebrae of the backbone.
....

2 Part

2 [A] Put (✓) or (✗) in front of the following statements :

1. Ozone gas consists of two oxygen atoms and symbolized by O_3 ( )
2. Carbon dioxide gas is used in the manufacture of gunpowder. ( )
3. The scale of medical thermometer starts from 35°C to 42°C. ( )
4. Nitrogen gas occupies 78% of the atmospheric air components. ( )
5. In legumes, the nodular bacteria fix nitrogen on their roots. ( )

[B] Give reasons for :

1. There is a constriction above the mercury bulb in the medical thermometer.
....
2. Carbon dioxide gas is used in extinguishing fires.
....
3. Damage of medulla oblongata leads to death.
....

3 [A] Choose the correct answer :

1. The best metal to conduct heat is ....
   a. aluminium. b. copper. c. iron.
2. Newton equals the weight of an object whose mass is .... grams.
   a. 10 b. 100 c. 1000
3. The ribcage in the human body consists of .... of ribs.
   a. 10 pairs b. 11 pairs c. 12 pairs
4. A gas used to fill some types of lamps is ....
   a. oxygen. b. carbon dioxide. c. nitrogen.
5. A tool which is used to measure the weight is ....
   a. spring scale. b. digital scale. c. two arm scales

[B] If the object's mass = 30 kg. on the Earth. Calculate :

1. Its mass on the moon.
....
....
2. Its weight on the Earth.
....
....
3. Its weight on the moon.
....
....



4 **[A] Write the scientific term of the following statements :**

1. An organ which is responsible for the reflex action. (........................)
2. A form of energy that transfers from the higher temperature object to the lower temperature object. (........................)
3. The gas that turbids limewater. (........................)
4. Materials that let heat flow through. (........................)
5. The amount of matter in an object. (........................)

[B] Look at the opposite figure, then write what the numbers point to :

① ....

② ....

③ ....

21 Luxor Governorate — The Educational Directorate

Answer the following questions :

1 **Complete the following statements :**

1. The graduation of clinical thermometer begins from .... °C and ends at ....°C.
2. .... consists of 33 vertebrae, with .... between them to prevent their friction during movement.
3. As the mass of the planet increases, its .... increases and the object's .... on its surface increases.
4. The main center of the control in your body is .... and it is found inside a bony box called ....

2 **[A] Write the scientific term of each of the following :**

1. Types of muscles act spontaneously and cannot be controlled. (........................)
2. A gas is used in making of stainless steel. (........................)
3. Part of the nervous system that is responsible for reflex actions. (........................)
4. A gas its molecule consists of three oxygen atoms. (........................)



5. The type of skeleton which includes the bones of upper and the lower limbs. (....................)

6. The liquid that is used in making of the Celsius thermometer. (....................)

[B] Give a reason for each of the following :

1. Oxygen gas is collected by displacing the water downwards during preparation in the laboratory.

....

2. Damage of the medulla oblongata causes death.

....

---

3 [A] Put (✓) or (✗) in front of the following statements :

1. Mass is the force of the Earth's gravity on an object. (   )
2. Handles of cooking pots are made of wood. (   )
3. Nitrogen gas reacts easily with most other elements. (   )
4. Oxygen gas does not burn and it does not help in burning. (   )

[B] Choose the correct answer from the following :

1. One of the examples of heat conductors is ....
   a. plastic. b. paper. c. iron.
2. The joint which allows the movement in one direction only is .... joint.
   a. immovable b. slightly movable c. freely movable
3. Nitrogen is used in manufacturing of ....
   a. fertilizers. b. soft drinks. c. dry ice.
4. Hydrogen peroxide is used in the preparation of ....
   a. oxygen. b. nitrogen. c. carbon dioxide.

---

4 [A] If an object's mass = 30 kg. on Earth's surface. Calculate :

1. Its mass on the moon's surface.

....

2. The weight on the Earth's surface. [Note : start by writing the law]

The law is : ....

....

[B] Look at the following figure, then answer :

1. This apparatus is used for the preparation of ....
2. Write what represents each label on the figure :
   ① ....
   ② ....
   ③ ....

22 Aswan Governorate — The Educational Directorate

Answer the following questions :

1 [A] Complete the following statements :

1. The clinical thermometer is graduated from .... °C to .... °C.
2. In photosynthesis process, the plant absorbs .... gas and produce .... gas.
3. From the examples of substances which are bad conductors of heat .... and ....
4. The axial skeleton in the man consists of .... , ... and ....
5. Mass is a constant and is not affected by ....

[B] Give one importance for the following :

1. Oxy-acetelyne flame.
   ....
2. Cartilage.
   ....

2 [A] Choose the correct answer from the following :

1. Your weight on Earth surface is 600 Newton, so your weight on moon surface is .... Newton.
   a. 6 b. 60 c. 100 d. 10
2. When a glowing magnesium ribbon is placed in a jar containing carbon dioxide, on the walls of the jar, the element formed is ....
   a. carbon. b. nitrogen. c. magnesium. d. oxygen.
3. Which of the following is faster in conducting heat ? ....
   a. Aluminium. b. Copper. c. Iron. d. Glass.



2 Part

4. All the following from the properties of mercury as thermometrical substance except ....
   a. good conductor of heat.
   b. its expansion is regular.
   c. give limited extent to measure the temperature.
   d. not adhere to the walls of capillary tube.

5. All the following are from the constituents of the brain except ....
   a. two cerebral hemispheres.
   b. cerebellum.
   c. medulla oblongata.
   d. spinal cord.

[B] Give reasons for the following :

1. Ozone layer has great importance in the life on the Earth surface.
   ....
2. The infection of modulla oblongata leads to death.
   ....

3 [A] Give scientific term of the following :

1. Materials that let heat flow through. (..................)
2. The amount of Earth gravity to the body. (..................)
3. Ligaments tie muscles with bones. (..................)
4. A gas used in ammonia industry. (..................)
5. The automatic response of the body when it is exposed to outer stimuli. (..................)

[B] What would happen in the following cases ... ?

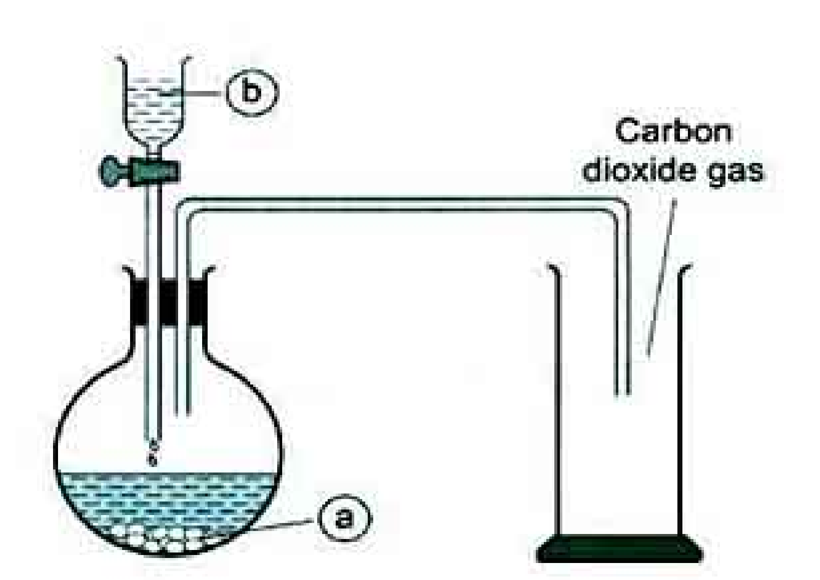
1. A nail wetted with water is exposed several days to humid air.
   ....
2. A man is exposed to noise continuously.
   ....

4 [A] Put (✓) or (✗) in front of the following statements :

1. Celsius thermometer is used to measure the temperature of different liquids. (   )
2. The digital balance is used in measuring weight. (   )
3. Wrist joint is freely movable joint. (   )
4. Heat transfers from hot body to cold body. (   )
5. Oxygen gas occupies 78% of the atmospheric air components. (   )



[B] Look at the opposite figure, then answer :



1. Write what represents each label on figure :
   - Substance (a) is ....
   - Liquid (b) is ....
2. Mention one use of the carbon dioxide gas :
   ....
   ....
   ....

23 New Valley Governorate — The Educational Directorate

Answer the following questions :

1 [A] Complete the following sentences :

1. Weight is the force by which .... to the Earth.
2. .... is produced from plants during the photosynthesis process.
3. .... thermometer is used for measuring the temperature of water.
4. .... is used for manufacturing of soil fertilizers.

[B] Mention the importance of each of the following :

1. Oxy-acetylene flame.
   ....
2. Spring scale.
   ....
3. Hot copper in preparing nitrogen from air.
   ....
4. Ozone layer.
   ....

2 [A] Choose the correct answer :

1. It is not from the upper limbs ....
   a. humerus. b. forearm. c. shaft.
2. When a mass of cleaning wire, which is made of iron gets burned in air with oxygen, its mass ....
   a. increases. b. decreases. c. doesn't change.



2 Part

3. Silver liquid metal ....

a. iron. b. copper. c. mercury.

4. The number of the spinal nerves in human is ....

a. 12 pairs. b. 31 pairs. c. 33 pairs.

[B] Mention the defectives of the addiction on the nervous system (only two) :

....

....

[C] Give reasons for the following :

1. Isolating the iron pillars of bridges from air by paints.

....

2. Carbon dioxide is used in extinguishing fires.

....

3 [A] Put (✓) in front of the right sentence and (✗) in front of the wrong sentence :

1. Mass of object is stable amount at any place. ( )
2. Oxygen cylinders are used during climbing mountains. ( )
3. Carbon dioxide is collected by displacing water downward. ( )
4. Iron and copper are considered conducting materials to heat. ( )
5. During the reflex action, nerve impulses transmit through sensory nerve fiber to the spinal cord. ( )

[B] What happened when ... ?

1. Passing carbon dioxide gas (CO_2) in calcium hydroxide (limewater).

....

2. Never leaving spaces between railways.

....

3. Adding little amount of water on a lighted magnesium ribbon in nitrogen.

....

4 [A] Compare between the following :

Comparison	Voluntary muscles	Involuntary muscles
Definition :	....	....
Example :	....	....



[B] An object's weight on the Earth's surface is 300 Newton, calculate :

1. Its mass on the Earth.

   ....

2. Its weight on the moon.

   ....

   ....

[C] Look at the medical thermometer in front of you, then answer :

1. Write what do numbers refer to :

   ① ....

   ② ....

   ③ ....

2. Complete :

   1. It is used in ....

   2. The beginning of its scale is .... °C and end at .... °C

24 South Sinai Governorate — The Educational Directorate

Answer the following questions :

1 [A] Complete the following statements :

1. The clinical thermometer is graduated from .... °C to ....°C.
2. Hydrogen peroxide is used in preparation of ....gas.
3. Nitrogen gas occupies ....% of atmospheric air.
4. .... and .... are from bad conductors of heat.

[B] Give reason for the following :

1. The ribcage surrounds both the heart and the lungs.

   ....

2. Oxygen gas is collected by down displacement of water.

   ....

[C] Compare between mass and weight according to :

Points of comparison	Mass	Weight
Device :	....	....
Unit :	....	....

2 Part

2 [A] Put (✓) or (✗) in front of the following statements and correct the false ones :

1. Aluminium conducts heat faster than copper. ( )
....
2. Wrist in hand from freely movable joints. ( )
....
3. Oxygen gas is used in cooling. ( )
....
4. The weight is constant and does not change with the change in place. ( )
....

[B] Mention one use for the following :

1. Good conductors of heat.
....
2. Bad conductors of heat.
....

[C] Look at the following figure then answer :

0 10 20 30 40 50 60 70 80 90 100

1. What is the name of this device ?
....
2. Mention the use of this device.
....
3. What is the liquid which is used in making it ?
....

3 [A] Choose the correct answer :

1. The weight of a body on Earth's surface is 20 Newton, so its mass equals ....
   a. 2 kg. b. 20 kg. c. 200 kg. d. 2000 kg.
2. In respiration and combustion, the .... gas is consumed.
   a. nitrogen b. argon c. oxygen d. carbon dioxide
3. All the following are from good conductors of heat except ....
   a. iron. b. glass. c. copper. d. aluminium.
4. Photosynthesis process in the plant depends on the presence of .... gas.
   a. oxygen b. nitrogen c. ozone d. carbon dioxide

[B] What would happen in the following cases ... ?

1. When your hand suddenly touches a hot surface.
....



2. The percentage of carbon dioxide gas increases in the atmospheric air.

....

[C] Mention one function of each of the following :

1. The cartilages.

....

2. Nitrogen gas.

....

4 [A] Write the scientific term of each of the following statements :

1. The force with which a body is attracted to the Earth. (....................)
2. A gas which change clear limewater turbid. (....................)
3. An organ consists of 33 vertebrae. (....................)
4. A gas which is necessary for rusting process. (....................)

[B] Join from (A) what is suitable from column (B) :

(A)	(B)
1. Cranial nerves	a. responsible for involuntary processes.
2. Spinal nerves	b. responsible for voluntary processes.
3. Medulla oblongata	c. responsible for reflex action.
4. Spinal cord	d. are 31 pairs.
	e. are 12 pairs.

1. .... 2. .... 3. .... 4. ....

25 North Sinai Governorate — The Educational Directorate

Answer the following questions :

1 [A] Complete the following sentences :

1. The number of vertebrae of vertebral column is ....
2. The main center of the control in your body is ....
3. The .... thermometer is used in measuring the water temperature.
4. The weight of the body on Earth's surface increases as the .... increases.
5. The nitrogen gas occupies .... % of atmospheric air.
6. The gas which is used with acetylene in welding metals is .... gas.



2
Part

[B] Give reason for the following :

1. Carbon dioxide gas is used in putting off fires.

....

2. Aluminium is used in manufacturing of cooking pans.

....

2 [A] Write the scientific term :

1. The amount of matter that the body contains. (........................)
2. A gas molecule consists of three atoms of oxygen. (........................)
3. The location of bones touch and allow moving. (........................)
4. A part of nervous system responsible for reflex action. (........................)
5. A gas used in ammonia industry. (........................)
6. The gas that turns limewater turbid. (........................)

[B] Define each of the following :

1. Temperature.

....

2. The bad heat conductor substances.

....

3 [A] Choose the correct answer :

1. Hydrogen peroxide is used in preparation of ....
   a. hydrogen. b. oxygen. c. nitrogen. d. carbon dioxide.
2. From the example of freely movable joints ....
   a. knee. b. thigh. c. elbow. d. all the previous.
3. The centers of thinking and memory lie in ....
   a. medulla oblongata. b. spinal cord.
   c. cerebellum. d. two cerebral hemispheres.
4. Your weight on Earth surface is 600 Newton, so your weight on moon surface is .... Newton.
   a. 6 b. 60 c. 100 d. 10
5. Nitrogen is used in manufacture of ....
   a. fire extinguisher. b. fertilizers. c. soft drink. d. dry ice.
6. The best metal in conducting heat is ....
   a. aluminium. b. copper. c. iron. d. mercury.

[B] Mention one function of each of the following :

1. Spring scale.

....

2. The ribcage.

....

4 [A] Choose from column (B) what is suitable from column (A) :

(A)	(B)
1. Kilogram	a. is a liquid used in manufacture of thermometers.
2. Celsius degree	b. is the measuring unit of mass.
3. Mercury	c. keep the balance of human body during movement.
4. Wieght	d. is the measuring unit of temperature.
5. The two arm balanced scale	e. is the force with which a body is attracted to the Earth.
6. Cerebellum	f. is a device of measurement of mass.

1. .... 2. .... 3. .... 4. .... 5. .... 6. ....

[B] What would happen in the following cases ... ?

1. An iron nail wetted by water is exposed several days to humid air.

....

2. The over intake of tea and coffee.

....

26 Red Sea Governorate — The Educational Directorate

Answer the following questions :

1 [A] Complete the following statements :

1. The mass is measured in .... unit.
2. The medical thermometer scale starts from .... degree to .... degree.
3. The number of cranial nerves is .... pairs.
4. The oxygen gas is consumed during .... and .... processes.



[B] Write one function of :

1. The spring scale.

....

2. Spinal cord.

....

2 [A] Choose the correct answer :

1. From the examples of widely movable joints ....
   a. knee. b. thigh. c. elbow.
2. The gas used to fill some types of lamps is ....
   a. oxygen. b. ozone. c. nitrogen.
3. Which is faster to conduct heat ....
   a. aluminium. b. iron. c. copper.
4. The part which is responsible for keeping human body balance is ....
   a. two cerebral hemispheres b. cerebellum
   c. spinal cord
5. From the bad conductors of heat ....
   a. iron and aluminum. b. copper and glass.
   c. glass and wood.
6. The gas present in the air with 21% is ....
   a. oxygen. b. nitrogen. c. water vapor.

[B] What happen when ... ?

1. Carbon dioxide gas percentage increases in the atmospheric air.

....

2. The overuse of tea and coffee during exams.

....

3 [A] If the mass of a body = 30 kg. on the Earth calculate :

1. Its weight on the Earth.

....

2. Its weight on the moon.

....

[B] Write the scientific term :

1. Matter which allow heat pass through. (........................)
2. A gas used to extinguishing fire. (........................)

3. A tool which is used for measuring liquids temperature. (....................)
4. A long strips fix muscles with bones. (....................)
5. The unit building of nervous system. (....................)
6. The main source to prepare nitrogen gas. (....................)

4 **[A] Correct the underlined word in each of the following statements :**

1. The liquid used in medical thermometer is **alcohol**. (....................)
2. **Hydrogen** gas is used in welding and cutting metal when combine with acetylene gas. (....................)
3. The vertebral column consists of **34 vertebra**. (....................)
4. Carbon dioxide gas is needed for **rusting process**. (....................)
5. The ozone molecule consists of **four** oxygen atoms. (....................)
6. The handles of cooking pans made up of **copper**. (....................)

[B] Give reason for the following :

1. There is a constriction in the medical thermometer.
....
2. Your weight on the moon less than that on the Earth.
....

27 Matrouh Governorate — The Educational Directorate

Answer the following questions :

1 **[A] Complete the following statements :**

1. The heat is a form of the forms of ....
2. The .... is the measuring unit of mass, whereas the .... is the measuring unit of weight.
3. .... is the main control center in human body.
4. The oxygen percentage in the air is .... % and nitrogen percentage in the air is .... %

[B] Mention the function of each of the following :

1. The ribcage.
....
2. Oxy-acetylene flame.
....



2 Part

2 [A] Choose the correct answer :

1. Different metals differ in conducting heat, the fastest is ....
   a. iron. b. copper. c. aluminium. d. gold.
2. An object whose mass on Earth is equal to 15 kg. its mass on the moon is ....
   a. 15 kg. b. 15 Newton. c. 150 kg. d. 150 Newton.
3. The gas used to fill some types of lamps is ....
   a. oxygen. b. nitrogen. c. ozone. d. carbon dioxide.
4. .... is a bad conductor of heat.
   a. Copper b. Wood c. Gold d. Mercury

[B] Give reason for the following :

1. Nitrogen is used in filling car tires.
   ....
2. Ozone layer has a great importance to the human life and all living organisms.
   ....
3. Mercury is preferred in making thermometers (two only).
   ....
   ....

---

3 [A] Write the scientific term :

1. A gas turbids the clear limewater. (...............)
2. A gas used in ammonia industry. (...............)
3. A human organ consists of an internal substance in the grey matter and it appears in the shape of letter (H) surrounded by the white matter. (...............)
4. Automatic response of the body to different stimuli. (...............)
5. The materials that let heat flow through. (...............)

[B] Calculate the mass of an object on the Earth if its weight on the Earth is equal 190 Newton.

....

---

4 [A] Put (✓) or (✗) in front of the following statements, then correct the wrong ones :

1. The number of cranial nerves is 31 pairs. ( )
   ....
2. The molecule of ozone gas consists of two oxygen atoms. ( )
   ....

3. The heat transfers from the cold object to the hot object. ( )

....

4. Knee joint is considered ed as freely movable joint. ( )

....

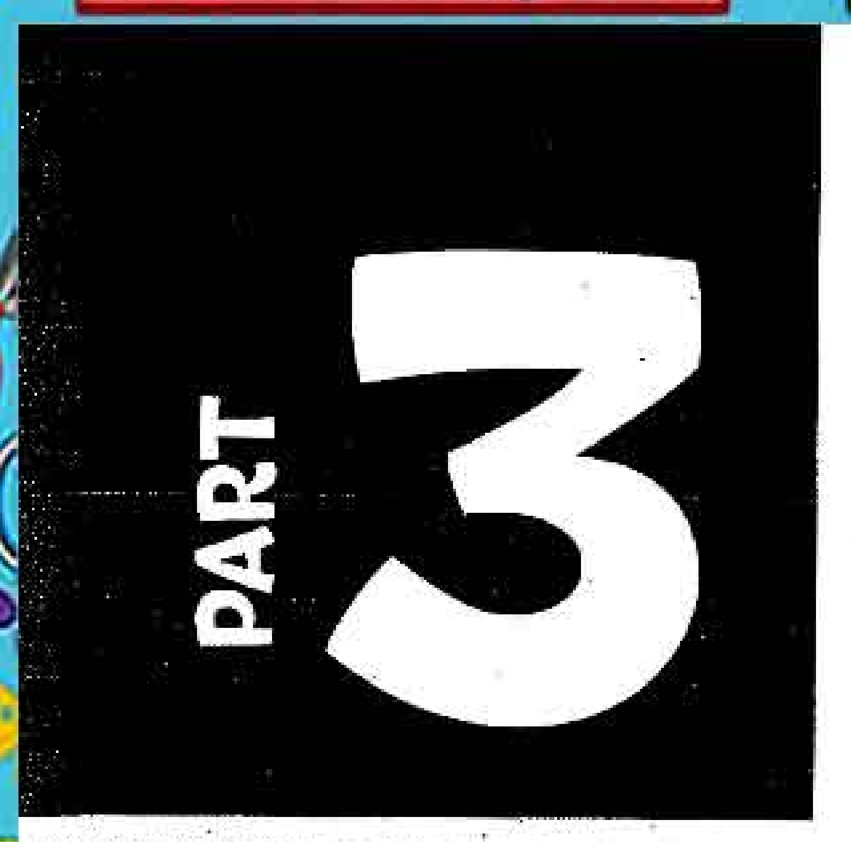
[B] From the opposite figure, complete :

① ....

② ....

③ ....

④ The figure. is ....



Final Examinations

Some exams questions have been modified according to the ministry modifications for the first term 2019 - 2020



PART 3

1 Cairo Governorate — Manar House International Schools

Answer the following questions :

1. Complete the following statements :

1. The Celsius thermometer is used in measuring the temperature of .... , while the medical thermometer is used in measuring the temperature of ....
2. Mass is measured by .... , whereas weight is measured by ....
3. Central nervous system consists of .... and ....
4. Limewater turns milky in presence of .... due to the formation of .... which is insoluble in water.
5. The ribcage protects .... and ....
6. Oxygen gas represents .... of the volume of air , while .... represents 78 % of the volume of the atmosphere.

2. [A] Write the scientific term of the following statements :

1. The used liquid in thermometers. (..................)
2. The building unit of nervous system. (..................)
3. Materials that used in making cooking pots and kettles. (..................)
4. The joint which allows the movement in all directions. (..................)
5. The gas that doesn't burn but it helps in burning. (..................)
6. A substance that is formed when a magnesium ribbon is burnt in a cylinder containing oxygen gas. (..................)

[B] Choose the correct answer :

1. The heat energy can be used in all the following applications except ....
   a. cooking. b. heating water.
   c. manufacture of glass. d. making a chair.
2. .... gas is prepared by adding dilute hydrochloric acid to calcium carbonate.
   a. Carbon dioxide b. Nitrogen c. Oxygen d. All the previous
3. The mass of your school desk depends on ....
   a. weight. b. gravity.
   c. amount of matter. d. distance from planet.



4. A Newton is the weight of a ball its mass is ....
   a. 80 grams. b. 8 kg. c. 8 grams. d. 100 grams.
5. .... gas is used with acetylene to weld metals.
   a. Carbon dioxide b. Nitrogen c. Oxygen d. All the previous
6. A rapid combination between oxygen and an element producing ....
   a. heat. b. light.
   c. (a) and (b). d. no correct answer.

3. [A] Give reasons for :

1. The presence of a constriction in the medical thermometer.
....
....
2. The cerebrum is a very important part of the brain.
....
....
3. Weight of an object on the Earth's surface is more than its weight in a balloon.
....
....
4. The handles of cooking pots are made of wood or plastic.
....
....

[B] Correct the underlined words in the following statements :

1. Ozone gas consists of <u>2</u> oxygen atoms. (.....................)
2. <u>**Newton**</u> is the amount of matter in an object. (.....................)
3. <u>**Light**</u> is a form of energy that transfers from the higher temperature object to the lower temperature object. (.....................)
4. The <u>**cerebrum**</u> controls the involuntary movement. (.....................)

4. [A] What happens when ... ?

1. You hold a piece of ice.
....
....
2. The percentage of CO_2 gas in air increases.
....
....



[B] Notice the following figure and write down the labels on the figure :

① ....

② ....

③ ....

④ ....

[C] Problem :

An object its mass on the Earth is 90 kg., calculate its weight on both surfaces of the Earth and the moon.

....

....

....

....

2 Cairo Governorate — Basateen and Dar El-Salam Educational Administration

Answer the following questions :

1. [A] Complete the following sentences :

1. Nervous system consists of two main systems which are .... and ....
2. Handles of cooking utensils are made up of .... and ....
3. Weight of an object can be measured by using the ....
4. Oxygen combines with acetylene gas to produce ....

[B] Write one function of the following :

1. Ribcage : ....
2. Carbon dioxide gas : ....
3. Celsius thermometer : ....

2. [A] Write the scientific term of each of the following statements :

1. Mixture of gases surrounding the Earth. (..................)
2. Degree of hotness or coldness of an object. (..................)
3. Automatic body response towards different stimuli. (..................)
4. A gas its percentage in the atmospheric envelope represents 78 %. (..................)
5. Amount of matter in an object. (..................)
6. The building unit of nervous system. (..................)



[B] Look at the opposite figure, and then answer :

1. Write what represents each label on the following figure :

ⓐ ....

ⓑ ....

2. The method of preparation of this gas is called ....

3. **[A] What happens when ... ?**

1. Two bodies have the same temperature touch each other .

....

....

2. Ozone layer is decayed.

....

....

3. The medulla oblongata is damaged.

....

....

[B] Choose the correct answer :

1. Melting point of ice is .... °C.

a. 100 b. zero c. 42 d. 37

2. A gas turns limewater into turbid is .... gas.

a. oxygen b. nitrogen c. ozone d. carbon dioxide

3. Peripheral nervous system consists of .... pairs of nerves.

a. 31 b. 12 c. 21 d. 43

4. 5000 grams are equal to .... kg.

a. 50 b. 500 c. 5 d. 0.5

4. **[A] Give reasons for each of the following :**

1. Presence of a constriction in medical thermometer.

....

....





2. Cerebrum is very important part of brain.

....

....

[B] If you know that the weight of an object on the Earth surface equals 360 Newton, calculate :

1. Mass of the object on the Earth.

....

....

2. Mass of the object on the moon's surface.

....

....

3. Weight of the object on the moon's surface.

....

....

3 Cairo Governorate — Heliopolis Educational Zone, Patriarchal College

Answer the following questions :

1. [A] Write the scientific term of the following statements :

1. The amount of matter in an object. (....................)
2. The building unit of the nervous system. (....................)
3. Location at which bones meet each other. (....................)
4. The speed automatic response of the body to external stimuli. (....................)

[B] What is the importance of the following :

1. Celsius thermometer.

....

2. The ozone layer.

....

2. [A] Choose the correct answer :

1. The gas that is mixed with oxygen for cutting and welding metals is ....

a. nitrogen. b. hydrogen. c. acetylene. d. water vapour.



2. The bone that connects the ribs from front is ....
   a. femur. b. skull. c. sternum. d. humerus.
3. The mass of half liter of distilled water equals ....
   a. 100 gm. b. 150 gm. c. 500 gm. d. 1000 gm.
4. A substance which is a good conductor of heat ....
   a. wool. b. plastic. c. iron. d. wood.

[B] Underline the unsuitable word in the following and mention the reason :

1. Shoulder joint - thigh joint - wrist joint - elbow joint.

   ....

2. Two cerebral hemispheres - spinal cord - medulla oblongata - cerebellum.

   ....

3. [A] Complete the following statements :

1. The scale of the medical thermometer starts from .... °C to .... °C.
2. .... pairs of nerves arise from the brain, while .... pairs of nerves arise from the spinal cord.
3. The weight of an object depends on ....
4. The fastest metal in conducting heat is ....

[B] Give reasons for the following :

1. Carbon dioxide gas is collected by upward displacement of air and isn't collected by displacement of water.

   ....

2. Mercury is used in making thermometers.

   ....

4. [A] Correct the underlined words in the following statements :

1. **Hydrogen peroxide** is used as a catalyst in preparing oxygen in the lab. (.....................)
2. The occurrence of the fermentation process in the dough **nitrogen** gas to release. (.....................)
3. **Vinegar** is used in sterilizing the medical thermometer before usage. (.....................)
4. **The white matter** in the spinal cord has the shape of letter "H". (.....................)





[B] If the weight of a person is 600 Newton on the Earth's surface, calculate :

1. Its mass on the Earth.

....

....

2. Its weight on the moon.

....

....

3. Its mass on the moon.

....

....

4 Cairo Governorate — Nozha Language Schools

Answer the following questions :

1. [A] Put (✓) or (✗) in front of the following :

1. The liquids expand by heating and contract by cooling. ( )
2. Hydrogen peroxide dissociates in the presence of a catalyst into nitrogen gas and oxygen gas. ( )
3. As the mass of the planet increases, its gravitational force decreases. ( )
4. Nitrogen gas represents 0.03 % of the air volume. ( )
5. Copper conducts heat faster than aluminium. ( )
6. The Earth is surrounded by a mixture of gases. ( )

[B] Give reasons for :

1. There is a constriction in the medical thermometer.

....

....

2. Ozone gas is important for the life of living organisms.

....

....

[C] Look at the opposite figure, and then answer :

1. This is the .... cell.
2. Write the labels :

ⓐ ....

ⓑ ....

ⓒ ....

2. [A] Match from column (B) what is suitable from column (A) :

(A)	(B)
1. Spring scale	a. used to measure the mass.
2. Clinical thermometer	b. used in making heavy blankets and woolen clothes.
3. Conductors	c. used to measure the body temperature.
4. One-arm scale	d. used to measure the weight.
5. Insulators	e. used to make cooking pots and kettles.

1. .... 2. .... 3. .... 4. .... 5. ....

[B] Correct the underlined words :

1. The melting point of ice is **– 39°C**. (..............)
2. **Oxidation** is a rapid union between oxygen gas and an element producing heat and light. (..............)
3. **Cerebrum** lies at the back area of the brain and maintains the balance of the body. (..............)
4. Carbon dioxide gas is collected by **downward** displacement of **water**. (..............)

[C] If the object's mass = 30 kg. on the Earth's surface. Calculate :

1. Its weight on the Earth.

....

2. Its weight on the moon.

....

3. [A] Complete the following statements :

1. Caron dioxide gas molecule consists of .... carbon atom and .... oxygen atoms.



2. The heat transfers from the object of .... temperature to the object of .... temperature.
3. .... is the force by which a body is attracted to the Earth.
4. The axial skeleton consists of .... , ... and ribcage.
5. Legumes such as clover and peas benefit from .... gas in the formation of proteins.

[B] Look at the opposite figure, and then answer :

1. This figure represents .... thermometer.
2. Label the figure :

① ....

② ....

③ ....

4. [A] Write the scientific term :

1. The degree of hotness or coldness of a body. (......................)
2. The product from the combination of magnesium with oxygen. (......................)
3. It consists of a gray matter in the form of letter "H" surrounded by a white matter. (......................)
4. A gas that prepared by adding dilute hydrochloric acid to calcium carbonate. (......................)
5. The measuring unit of mass which almost equals to a mass of one liter of distilled water. (......................)

[B] Choose the correct answer :

1. .... are the joints that allow the movement in one direction
   a. Freely movable joints b. Immovable joints c. Slightly movable joints
2. Oxygen gas ....
   a. doesn't burn and doesn't help in burning.
   b. burns and helps in burning.
   c. doesn't burn but helps in burning.
3. The mass of a desk depends on the ....
   a. weight. b. amount of matter.
   c. distance from the planet center.



4. Ahmed can sterilize the thermometer by using ....

a. water. b. benzene. c. ethyl alcohol.

5. The main source of oxygen in air is .... process.

a. photosynthesis b. respiration c. oxidation

[C] What happens when ... ?

1. Carbon dioxide passes through limewater.

....

2. A medical thermometer is put in boiled water.

....

5 Cairo Governorate — Nasr Official Language School

Answer the following questions :

1. [A] Write the scientific term :

1. A gas mixed with oxygen to be used in welding metals. (....................)
2. The degree of hotness or coldness of a body. (....................)
3. A layer in the atmosphere that protects the Earth from harmful radiations coming from the Sun. (....................)
4. A gas that raises the Earth temperature when its percentage increases. (....................)
5. Automatic response of the body to different stimuli. (....................)
6. The system that consists of cranial nerves and spinal nerves. (....................)
7. A rapid union of oxygen with an element producing heat and light. (....................)
8. The basic structure unit of the nervous system. (....................)

[B] Compare between :

Points of comparison	Cranial nerves	Spinal nerves
Definition :	....	....
Number :	....	....



2. **[A] Complete the following statements :**

1. Magnesium reacts with carbon dioxide forming a white powder of .... and a black powder of ....
2. The graduation of the clinical thermometer is between .... and ....
3. The measuring unit of weight is ...., while the measuring unit of mass is ....

[B] Write the function of :

Spring scale.

....

3. **[A] Put (✓) in front of the right statements and (✗) in front of wrong one :**

1. All materials are good conductors of heat. ( )
2. The Earth gravitational force decreases as the distance between an object and the center of the planet increases. ( )
3. Mass differs according to the planet where the object exists. ( )
4. The white matter of the spinal cord has the shape of letter "H". ( )
5. The cerebellum contains centers of thinking and memory. ( )
6. The Celsius thermometer is used in measuring the human body temperature. ( )

[B] Give reasons for :

1. There is a constriction in the medical thermometer.

....

....

2. Clear limewater becomes turbid when carbon dioxide passes into it.

....

....

3. Damage of the medulla oblongata causes death.

....

....

4. **[A] Choose the correct answer :**

1. Among the freely movable joints are .... joints.

a. knee b. thigh c. elbow d. skull



2. All the following are from the constituents of the human skeletal system except ....

a. joints. b. backbone. c. spinal cord. d. ribcage.

3. Photosynthesis process in the plant depends on the presence of ....

a. nitrogen. b. oxygen. c. carbon dioxide. d. ozone.

4. Humerus bone is one of the bones of ....

a. lower limbs. b. upper limbs. c. backbone. d. axial skeleton.

5. Your weight on the moon surface is 50 Newton, so your weight on the Earth surface is .... Newton.

a. 300 b. 500 c. 10 d. 100

[B] What will happen when :

The overuse of soft drinks.

....

....

[C] Correct the underlined word :

1. **Water** is a regular expanding material. (....................)

2. Human ribcage composed of **31 pairs** of ribs. (....................)

6 Cairo Governorate — Saint Mary's School

Answer the following questions :

1. [A] Choose the correct answer :

1. .... is the gravitational force by which a body is attracted to the Earth.

a. Weight b. Mass c. Volume d. Density

2. Cooking utensils are provided with handles of ....

a. copper. b. plastic. c. iron. d. aluminium.

3. Every degree in the medical thermometer is divided into .... parts.

a. 3 b. 5 c. 6 d. 10

4. Oxygen is .... than air.

a. heavier b. lighter c. colder d. hotter



5. A gas which turns limewater into turbid is .... gas.

a. oxygen b. nitrogen c. carbon dioxide d. ozone

6. The axon is covered with a fatty substance called ....

a. gray matter. b. synapse. c. myelin sheath. d. dendrites.

[B] Classify each of the following joints according to their types :

1. Skull joints.

....

2. Knee joint.

....

3. Wrist joint.

....

[C] Mention one importance of :

1. Cerebellum.

....

2. Celsius thermometer.

....

3. Yeast.

....

2. [A] Write the scientific term of each of the following statements :

1. An organ contains the centers of thinking and memory. (....................)
2. A gas is called azote which means lifeless gas. (....................)
3. The product of combination of oxygen with lighted magnesium. (....................)
4. The liquid used in sterilizing the medical thermometer. (....................)
5. The measuring unit of weight. (....................)
6. Materials that do not let heat flow through. (....................)

[B] What happens when ... ?

1. Addition of dilute hydrochloric acid to over calcium carbonate.

....

2. Absence of a constriction above the mercury bulb of the medical thermometer.

....

....

3. Drinking big quantities of soft drinks.

....



3. **[A] Complete the following statements :**

1. The scale of medical thermometer starts from 35°C to ....
2. The objects seem weightless in the space due to the absence of ....
3. The dendrites are connected to neighbouring neurons composing the ....
4. Oxygen combines with acetylene gas to produce ....

[B] Correct the underlined words in the following statements :

1. Water is composed of oxygen and **nitrogen**. (....................)
2. The normal temperature of the healthy person is **35°C**. (....................)
3. The effect of weight is always directed towards the **surface** of the Earth. (....................)
4. The automatic response of the body to the external stimuli is known as the **voluntary response**. (....................)

4. **[A] Put (✓) or (✗) in front of the following :**

1. Backbone consists of 31 pairs of ribs. ( )
2. Dendrites are branches extend from the neuron's cell body. ( )
3. Gasoline is the material that is used in making cigarettes. ( )
4. Oxygen cylinders are used during diving and climbing mountains. ( )
5. The different metals transfer heat at the same rate. ( )

[B] Give reasons for :

1. The mass of a body on the Earth's surface equals the mass of the same body on the moon's surface.

....

....

2. Although oxygen is consumed during respiration, its percentage remains stable in the atmosphere.

....

....

[C] If an object's mass = 12 kg. on the Earth, calculate :

Its weight on the moon.

....

....



7 Giza Governorate — Child Home Language School

Answer the following questions :

1. Complete the following statements :

1. Mass is measured by ...., while weight is measured by ....
2. The clinical thermometer is scaled from .... to ....
3. Exhaled air contains .... gas which turbid ....
4. The nervous system is composed of .... and ....
5. The catalyst remains without change in its .... and ....
6. The nitrogen gas molecule consists of .... atoms.
7. The number of cranial nerves is ....

---

2. [A] Give reasons for :

1. The force of the moon's gravity is less than that of the Earth's gravity.
....
....
2. Leaving spaces between the railway bars.
....
....
3. Percentage of oxygen gas remains constant in air.
....
....
4. Yeast is added to dough during making bread.
....
....
5. We must avoid using tranquilizers and stimulants.
....
....
6. Nitrogen gas is called "azote" which means lifeless.
....
....

[B] Write one function of :

1. Dendrites of the nerve cell.
....



2. Skull.

....

3. Ribcage.

....

4. Oxy-acetylene flame.

....

5. Medulla oblongata.

....

6. Heat insulators.

....

3. [A] What happens if ... ?

1. The distance between the body and the center of the Earth increases.

....

2. There is no constriction above mercury bulb in clinical thermometer.

....

3. Dilute hydrochloric acid is dropped over calcium carbonate.

....

4. Nodular bacteria are removed from plants roots.

....

5. An iron nail wetted by water is exposed for many days to humid air.

....

6. Hydrogen peroxide is dropped over manganese dioxide.

....

[B] Label the following figure :

① ....

② ....

③ ....

④ ....

⑤ ....

⑥ ....





PART 3

4. **[A] Write the scientific term :**

1. The amount of matter in an object. (....................)
2. Group of joints that allow movement in one direction. (....................)
3. The fast reaction of an element with oxygen which generate heat. (....................)
4. An organ responsible for reflex action. (....................)
5. A liquid used to sterilize thermometer. (....................)

[B] If the mass of a body on the Earth is 18 kg. Calculate :

1. Its mass on the moon.
....
2. Its weight on the Earth.
....
3. Its weight on the moon.
....

[C] What is meant by ... ?

1. Oxidation.
....
2. Reflex action.
....
3. The atmosphere.
....

8 Giza Governorate — Al-Agoza Educational Directorate

Answer the following questions :

1. **[A] Write the scientific term for each of the following :**

1. A part of the nervous system is responsible for reflex action. (....................)
2. The amount of matter that the body contains. (....................)
3. The substances that allow heat to pass through. (....................)
4. A flame is used in cutting and welding metals. (....................)

[B] Mention one function :

The ozone layer.
....

2. **[A] Complete the following statements :**

1. The human skeletal system consists of .... and ....
2. Oxygen is consumed in .... and ....
3. The mass is measured in .... unit , but the weight is measured in .... unit.
4. The number of spinal nerves in human is .... and the number of cranial nerves is ....

[B] What happens when :

An iron nail moistened with water is exposed to a humid atmosphere for several days.

....

3. **[A] Choose the correct answer :**

1. We use .... to make the electric iron handle.
   a. iron b. copper c. plastic d. aluminium
2. The carbon dioxide is used in the industry of ....
   a. steel. b. gun powder. c. fertilizers. d. soft drinks.
3. If the weight of a body is 20 Newton its mass equals ....
   a. 2 kg. b. 20 kg. c. 200 kg. d. 2000 kg.
4. All the following are from the components of central nervous system except ....
   a. spinal nerve. b. two cerebral hemispheres.
   c. spinal cord. d. medulla oblongata.

[B] Correct the underlined words :

1. **Nitrogen** doesn't burn , but it helps in burning. (...............)
2. The part which is responsible for keeping human body balance is **spinal cord**. (...............)

4. **[A] Give reasons for each of the following :**

1. There is a constriction in the medical thermometer.

....

2. The ribcage surrounds both the heart and the lungs.

....





[B] Look at the opposite figure, then answer :

1. Label the figure :
   ① ....
   ② ....
2. Carbon dioxide is collected by upward displacement of air. Why ?

....

9 Giza Governorate — Dar El-Hanan Language School

Answer the following questions :

1. [A] Complete the following statements :

1. The main idea of making thermometers is the changing the .... of a liquid by changing the ....
2. The percentage of carbon dioxide gas in the atmospheric air is .... and has the symbol of..............

[B] What's the importance of ... ?

1. Spring scale.

....

2. Skull.

....

2. [A] Write the scientific term of each of the following :

1. The measuring unit of mass which is equal to the mass of one liter of distilled water at normal temperature. (....................)
2. The liquid that is used in making the medical and the Celsius thermometers. (....................)
3. A gas that its molecule is composed of three oxygen atoms. (....................)
4. The building unit of the nervous system. (....................)

[B] Problem :

An object's mass = 30 kg. on the Earth's surface , calculate its weight on the Earth's surface.

....

....



3. **[A] Put (✓) in front of the right statement and (✗) in front of the false one and correct the wrong ones :**

1. Oxygen gas is prepared from hydrogen peroxide dissociates in the presence of carbon dioxide gas. (   )

   ....

2. Oxygen combines with a lighted magnesium ribbon forming a white substance. (   )

   ....

3. The axon of the nerve cell is surrounded by a gelatinous layer . (   )

   ....

4. The bones of the lower limbs consist of humerus bone, forearm bones and hand bones . (   )

   ....

[B] Give reasons for the following :

1. The handles of cooking utensils are made of plastic or wood.

   ....

2. Clear limewater gets turbid if carbon dioxide gas passes through it.

   ....

---

4. **[A] Classify each of the following joints according to their types :**

1. Skull joints.

   ....

2. Knee joint.

   ....

3. Shoulder joint.

   ....

[B] Look at the following figure, then answer :

1. Liquid ① : ....
2. Substance ② : ....
3. Carbon dioxide is collected by upward displacement of air. Why ?

   ....

   ....

   ....



PART I

3

10 Giza Governorate — Future Generation Language School

Answer the following questions :

1. [A] Complete the following sentences :

1. The .... controls the reflex action.
2. Carbon dioxide gas is turned into liquid by .... and ....
3. From slightly movable joints ....
4. The dendrites are connected to neighbouring neurons composing the ....
5. Oxygen gas is produced through .... process and consumed in .... process.
6. An object's weight is affected by the distance being away from the .... of the planet.

[B] Give reasons for :

1. Carbon dioxide is collected by upward displacement of air.

....

....

2. Damage of medulla oblongata causes death.

....

....

2. [A] Choose the correct answer :

1. Mercury remains in liquid state between .... °C.
   a. (39 : 357) b. (39 : – 357) c. (– 39 : 357) d. (0 : 100)
2. Newton is almost equal to the weight of an object whose mass is .... grams.
   a. 10 b. 100 c. 1000 d. 0.1
3. The centers of thinking and memory lie in ....
   a. medulla oblongata. b. spinal cord. c. cerebellum. d. two cerebral hemispheres.
4. The best metal in conducting heat is ....
   a. aluminium. b. copper. c. iron. d. mercury.





[B] If the object's weight on the Earth's surface is 30 Newton. Calculate :

1. Its mass on the Earth.

....

2. Its weight on the moon.

....

3. [A] Write the scientific term of the following :

1. A mixture of different gases that surrounds the Earth. (....................)
2. It's the main control center in the human body. (....................)
3. An indicator helps us to express the state of the body from the point of hotness and coldness. (....................)
4. A gas molecule consists of three oxygen atoms. (....................)

[B] What happens if ... ?

1. An iron nail wetted by water is exposed several days to humid air.

....

2. Touching a very hot surface.

....

4. [A] Put (✓) or (✗) and correct the wrong one :

1. The number of cranial nerves in man is 31 pairs. (   )

....

2. The main idea to make a thermometer is changing mass of the mercury according to the change in the temperature. (   )

....

[B] Mention one importance for :

1. Spring scale.

....

2. Cerebellum.

....

3. Oxy-acetylene flame.

....





PART 3

[C] Look at the figure , then answer the questions :

1. Label the figure :

① ....

② ....

③ ....

2. What's the importance of number ② ?

....

....

....

11 Alexandria Governorate — South Alex. Educational Zone

Answer the following questions :

1. **[A] Complete the following statements :**

1. Mass is measured by .... , where weight is measured by ....
2. The axial skeleton in the man consists of .... , ... and ....
3. The heat is a form of the forms of ....
4. The oxygen gas of the atmosphere is consumed during .... and ....

[B] Compare between :

Points of comparison	Celsius thermometer	Medical thermometer
1. Usage :	....	....
2. Range of scale :	....	....

2. **[A] Write the scientific term :**

1. A bony case that contains brain inside. (..............)
2. A gas used in its preparation hydrogen peroxide. (..............)
3. The gas that turns limewater into turbid. (..............)
4. The flame which is used in cutting and welding metals. (..............)
5. The product substance from the combination of magnesium and oxygen. (..............)
6. A gas molecule consists of three atoms of oxygen. (..............)

[B] Look at the opposite figure , then label the figure :

① ....

② ....

③ ....

3. **[A] Choose the correct answer :**

1. The gray matter in the spinal cord , its shape like .... letter.
   a. A b. H c. F
2. Nitrogen molecule consists of .... nitrogen atoms.
   a. four b. three c. two
3. The ribcage in the man consists of .... pairs of ribs.
   a. 11 b. 10 c. 12
4. Backbone consists of .... vertebrae.
   a. 32 b. 33 c. 23
5. Which of the following is from slightly movable joints ? ....
   a. Femur. b. Wrist. c. Knee.
6. A catalyst used in preparation of oxygen gas in laboratory is ....
   a. sodium carbonate. b. copper oxide. c. manganese dioxide.

[B] If an object's mass = 30 kg. on the Earth. Calculate :

1. Its mass on the moon.

....

2. Its weight on the Earth.

....

4. **[A] Join from column (A), what is suitable from column (B) :**

(A)	(B)
1. Alcohol	a. protects the Earth from harmful radiations.
2. Cranial nerves	b. is a liquid used in sterilizing of thermometers.
3. Plastic	c. are 12 pairs of nerves.
4. Ozone	d. are 31 pairs of nerves.
	e. is a bad conductor of heat.

1. .... 2. .... 3. .... 4 . ...

PART 3

[B] Give reasons for :

1. The yeast is added to dough on making bread.

....

2. The heart and lungs are surrounded by ribcage.

....

[C] Cross out the odd word :

1. Humerus bone – Shaft bones – Forearm bones – Hand bones. (..................)
2. Two lower limbs – Skull – Backbone – Ribcage. (..................)

12 Alexandria Governorate El-Gomrok Educational Zone

Answer the following questions :

1. **[A] Complete the following statements :**

1. Oxygen gas is prepared by decomposing .... in the presence of .... as a catalyst.
2. The .... is the site of two bones meeting.
3. Liquids .... by heating and .... by cooling.
4. The measurement unit of mass is .... , while measurement unit of weight is ....

[B] Give reason for each of the following :

1. Mercury is used in thermometers (two point).

....

....

2. The damage of the medulla oblongata causes death.

....

....

2. **[A] Choose the correct answer :**

1. The .... controls the reflex actions.
   a. spinal cord b. cerebellum c. cerebrum
2. Newton is equal to the weight of body, its mass is ....
   a. 10 gm. b. 100 gm. c. 1000 gm.



3. Carbon dioxide is collected by displacing ....

a. air downward. b. air upward. c. water downward.

4. The knee and elbow joints are ....

a. immovable. b. slightly movable. c. free movable.

[B] What is the importance of each of the following ... ?

1. A constriction in the medical thermometer.

....

2. Cartilages.

....

3. [A] Write the scientific term :

1. A flame whose temperature reaches to 3500° C. (..................)
2. The fastest metal in conducting heat. (..................)
3. A bony case that contains brain inside. (..................)

[B] Problem :

If an object's mass on the Earth = 30 kg. Calculate :

1. Its mass on the moon.

....

2. Its weight on the Earth.

....

3. Its weight on the moon.

....

4. [A] Correct the underline words :

1. We should use <u>water</u> to sterilize the medical thermometer. (..................)
2. The <u>cerebrum</u> is responsible for the body's balance. (..................)

[B] Compare between the properties of :

Points of comparison	Oxygen gas	Carbon dioxide gas
1. Reaction with magnesium :	....	....
2. Dissolving in water :	....	....

PART 3

13 Alexandria Governorate — East Alex. Educational Zone

Answer the following questions :

1. [A] Complete the following statements :

1. Materials are classified according to conducting heat into .... conductors and .... conductors.
2. The measuring unit of weight is .... , while the measuring unit of mass is ....
3. The scale of medical thermometer starts from .... °C and ends at .... °C.
4. The central nerves system is composed of .... and ....

[B] Give reasons for each of the following :

1. Carbon dioxide gas is used in extinguishing fires.
....
....
2. Ozone gas is very important in nature.
....
....

2. [A] Write the scientific term for each of the following :

1. The amount of matter in an object. (.....................)
2. A bony box that contains cavities for eyes, ears and nose. (.....................)
3. A gas that is the most important part in protein. (.....................)
4. A flame is used in cutting and welding metals. (.....................)

[B] Mention one function for each of the following :

1. Celsius thermometer.
....
2. The ribcage.
....

3. [A] Put (✓) or (✗) in front of each of the following :

1. Cooking pots are made up of plastic. (   )
2. Humerus bone and forearm bones are from the parts of the lower limbs. (   )
3. The cerebellum is responsible for maintaining the body balance during movement. (   )

[B] Correct the underlined words :

1. Ozone is composed of **two** oxygen atoms. (....................)
2. Carbon dioxide gas is prepared in laboratory from reaction between dilute hydrochloric acid and **copper sulphate**. (....................)
3. The liquid used in the medical thermometer is **alcohol**. (....................)

4. [A] Choose the right answer from the following :

1. The myelin sheath covers ....
   a. the axon on the nerve cell. b. cerebrum. c. medulla oblongate.
2. The weight of an object on the Earth's surface is 6 Newton, so its weight on the moon's surface is .... Newton.
   a. 1 b. 6 c. 10
3. The measuring device of the mass is ....
   a. spring scale. b. thermometer. c. sensitive balance.

[B] Look at the opposite figure, then complete the labels :

① ....
② ....
③ ....

14 Kalyoubia Governorate — Memphis language school

Answer the following questions :

1. [A] Complete the following statements :

1. The force by which the body is attracted to the Earth is called ....
2. Handles of cooking pots are made of ....
3. The number of spinal nerves is .... and number of cranial nerves is ....

[B] Mention one function of each of the following :

1. Oxy-acetylene flame.
   ....
2. Cerebellum.
   ....







[C] What is meant by :

1. Newton.

....

....

2. Temperature.

....

2. **[A] Write the scientific term of each of the following :**

1. Materials that don't let heat to pass through. (....................)
2. Automatic response of the body to different stimuli. (....................)
3. The part of the brain that is responsible for regulating the heartbeats. (....................)
4. A chemical substance that increases the speed of the reaction without changing in its quantity and structure. (....................)
5. A device used to measure the temperature of liquids. (....................)

[B] Give reasons for :

1. There is a constriction in the medical thermometer.

....

....

2. Clear limewater becomes turbid when carbon dioxide passes.

....

....

3. **[A] Put (✓) or (✗) and correct the wrong one :**

1. The mass of the body changes as its location changes. (   )

....

2. Woolen clothes are good conductors of heat. (   )

....

3. In the Celsius thermometer there is a constriction in the capillary tube. (   )

....

4. Shoulder joint is an immovable joint. (   )

....



5. Copper is a good conductor of heat. (   )

....

6. Ozone gas is composed of four atoms of oxygen. (   )

....

[B] Look at the opposite figure, then answer :

1. This apparatus represents the preparation of .... gas.
2. Solution ⓐ is ....
3. The produced gas is collected by downward displacement of water because it ....

....

[C] If the mass of an object on the Earth is equal to 60 kg., calculate :

1. Its weight on the Earth's surface.

....

2. Its weight on the moon's surface.

....

3. Its mass on the moon's surface.

....

4. [A] What happens when ... ?

1. Over intaking of the stimulating substance such as coffee.

....

2. Increasing the percentage of carbon dioxide gas in the atmosphere.

....

[B] Give one example of each of the following :

1. An immovable joint.

....

2. Measuring device of small masses.

....





15 Gharbia Governorate — East Tanta Educational Zone

Answer the following questions :

1. [A] Complete the following statements :

1. The weight of anybody .... when the distance between the body and the center of the planet .... as the gravitational force decreases.
2. We can use .... thermometer to measure the temperature of different liquids, whereas .... thermometer is used in measuring the temperature of the human body.
3. Oxygen gas is prepared by the decomposition of .... in the presence of .... as a catalyst.
4. The neuron consists of two main parts .... and ....

[B] Give reasons for each of the following :

1. When you burn a ball of cleansing wire strongly, its mass increases.
....
....
2. The withdrawal of the hand quickly when it suddenly touches a hot surface.
....

---

2. [A] Write the scientific term for each of the following :

1. The materials that let heat flow through. (..........................)
2. A chemical substance that remains without any change in its quantity and structure during the chemical reaction. (..........................)
3. The main control center in the human body. (..........................)
4. The system that consists of 43 pairs of nerves. (..........................)

[B] An object whose mass on the Earth equals 12 kg. Calculate :

1. Its weight on the Earth.
....
....
2. Its weight on the moon.
....
....



3. [A] Correct the underlined words :

1. The main idea to make a thermometer is changing the **mass** of liquid according to the temperature. (....................)
2. Ozone molecule consists of **four** atoms. (....................)
3. When a lighted magnesium ribbon is inserted in a cylinder filled with **oxygen** a black substance deposits on the wall of the cylinder. (....................)
4. **Cerebellum** connects the brain with spinal cord. (....................)

[B] Look at the opposite figure, then answer :

1. This apparatus is used for the preparation of ....
2. Write down the labels on the figure :
   - Liquid ① is ....
   - Substance ② is ....
   - Gas ③ is ....

4. [A] Choose the correct answer :

1. The device of measuring weight is ....
   a. sensitive scale. b. spring scale.
   c. digital scale. d. double pans scale.
2. The best metal in conducting heat is ....
   a. aluminium. b. iron. c. copper. d. mercury.
3. The gas which turns limewater turbid is .... gas.
   a. oxygen b. nitrogen c. carbon dioxide d. ozone
4. The centers of thinking and memory lie in ....
   a. medulla oblongata. b. spinal cord.
   c. cerebellum. d. two cerebral hemispheres.

[B] What would happen in the following cases :

1. Drinking big quantities of soft drinks.
   ....
   ....
2. The cerebellum is shocked hardly.
   ....
   ....



PART 3

16 Dakahlia Governorate — Science Inspectorate

Answer the following questions :

1. [A] Choose the correct answer :

1. The device of measuring weight is ....
   a. one-arm scale. b. two-arms scale.
   c. digital scale. d. spring scale.
2. Reflex action takes place through the ....
   a. medulla oblongata. b. spinal cord. c. cerebellum. d. cerebrum.
3. Cooking utensils are provided with handles of ....
   a. copper. b. wood. c. iron. d. aluminium.
4. Newton equals the weight of an object whose mass is .... kg.
   a. 100 b. 10 c. 1 d. 0.1
5. The centers of thinking and memory lie in ....
   a. medulla oblongata. b. spinal cord. c. cerebrum. d. cerebellum.
6. The ribcage in the human body consists of .... of ribs.
   a. 10 pairs b. 11 pairs c. 12 pairs d. 13 pairs

[B] Give reasons for :

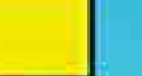
1. There are cartilages between the vertebrae of the backbone.
   ....
2. Mercury is used in thermometers.
   ....
3. Oxygen gas is collected by downward displacement of water.
   ....

---

2. [A] Complete the following statements :

1. The percentage of carbon dioxide gas in the atmospheric air is .... and has the symbol ....
2. The knee joint is considered from .... joints, while the wrist joint is considered from .... joints.
3. The central nervous system consists of .... and ....
4. Oxygen atom + oxygen atom = ...
5. .... conducts heat faster than aluminium.





[B] What happens when ... ?

1. Damage of medulla oblongata.
   ....
2. Hydrogen peroxide is dropped over manganese dioxide.
   ....

3. [A] Put (✓) in front of the correct statement and (✗) in front of false one :

1. The mass of the body changes as its location changes. (   )
2. The scale of medical thermometer starts from 35°C to 42°C. (   )
3. Cerebellum maintains the balance of the body during movement. (   )
4. All materials are good conductors of heat. (   )
5. Magnesium combines with oxygen gas forming a black substance. (   )
6. In the Celsius thermometer there is a constriction in the capillary tube. (   )

[B] Look at the following figure, then answer :

1. Write what represents each label on the figure.
   - Substance ⓐ : ....
   - Liquid ⓑ : ....
2. Mention two uses of the evolved gas.
   ....
3. The produced gas is not collected by downward displacement of water. Why ?
   ....

b
a
A gas

4. [A] Write the scientific term of each of the following :

1. The gas protects the Earth from harmful radiation. (..................)
2. A bony box contains brain and cavities for eyes , ears and nose. (..................)
3. It passively affects the nervous system causes retardation of memory and learning. (..................)
4. A gas that composes the protein substance that builds up our bodies. (..................)
5. The basic structure of the nervous system. (..................)
6. The liquid that is used in sterilizing the medical thermometer. (..................)

[B] If the weight of a body on the moon 100 Newton. Calculate :

1. Its weight on the Earth.
   ....
2. Its mass on the moon.
   ....

[C] Compare between :

Point of comparison	Spinal nerves	Cranial nerves
Number	....	....



PART 3

17 Ismailia Governorate — Science Inspectorate

Answer the following questions :

1. [A] Complete the following statements :

1. The scale of Celsius thermometer starts from .... °C and ends at .... °C.
2. The number of vertebrae of the backbone is .... vertebrae, while the ribcage consists of .... pairs of ribs.
3. In the atmospheric air oxygen gas exists by .... % and nitrogen gas exists by percentage .... % .
4. Mass is measured by using ...., while weight is measured by using ....

[B] Calculate :

If an object's mass = 30 kg. on the Earth :

1. Its mass on the moon.

....

2. Its weight on the Earth.

....

2. [A] Write the scientific term :

1. The force with which a body is attracted to the Earth. (.........................)
2. It is the degree helps us to express the hotness or coldness of an object. (.........................)
3. The gas that raises the temperature of the Earth when its percentage increases in air. (.........................)

[B] Choose from column (B), what suits it in column (A) :

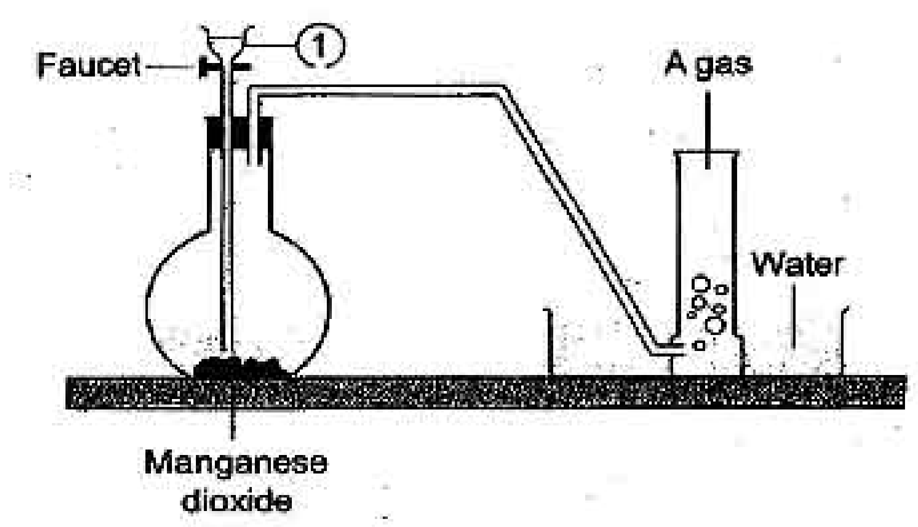
(A)	(B)
1. Joints 2. Neuron 3. Cerebellum 4. Cartilages 5. Medulla oblongata 6. Cerebrum	a. prevent the friction between vertebrae. b. is responsible for regulating the involuntary processes. c. is the building unit of nervous system. d. the location where bones meet in the body. e. is rapid combination between element and oxygen. f. keeps the balance of human body during movement. g. is responsible for regulating the voluntary movements.

1. .... 2. .... 3. ....
4. .... 5. .... 6. ....

3. **[A] What happens when ... ?**

1. The distance between a person in a balloon and the center of the Earth increases.
....
2. Sitting for long times in front of the computer.
....
3. You shake the medical thermometer before using it.
....
4. Knee joints become freely movable joints.
....

[B] Look at the opposite figure then answer the following questions :



1. Mention the name of the gas which is prepared.
....
2. This gas is collected by downword displacement of water. Why ?
....
3. Substance no. ① is :
....
4. The function of manganese dioxide is ....

4. **[A] Give reasons for :**

1. Using oxy-acetylene flame in cutting and welding metals.
....
2. The handles of cooking pots are made of plastic, while the cooking pots are made of aluminium.
....
3. The brain is located inside the skull.
....

[B] Correct the underlined words with right words :

1. **Nitrogen** gas combines with elements forming oxides (oxidation). (....................)
2. The **white** matter in the spinal cord has the shape of letter "H". (....................)
3. When the exhaled air passes through clear limewater, it forms **calcium oxide.** (....................)
4. The bones of lower limbs connected to the **shoulder** bones. (....................)
5. **Iron** is the fastest element in conducting heat. (....................)
6. The magnesium ribbon keeps burning and turns into **yellow** colour in cylinder which contains carbon dioxide gas. (....................)



18 Port Said Governorate — Science Inspectorate

Answer the following questions :

1. Complete the following statements :

1. The measurement unit of mass is .... , whereas the measurement unit of weight is ....
2. There is a constriction in the .... thermometer.
3. The .... thermometer is used to measure the water temperature.
4. Oxygen gas is prepared in laboratory from .... in presence of ....

2. [A] Choose the correct answer :

1. When a glowing magnesium ribbon is placed in a jar containing carbon dioxide, on the walls of the jar the element formed is ....
   a. oxygen. b. nitrogen. c. hydrogen. d. carbon.
2. The joint is the location of meeting of ....
   a. two bones. b. muscle with bone.
   c. two muscles. d. two cells.
3. The best metal in conducting heat is ....
   a. aluminium. b. copper. c. iron. d. wood.
4. The gas which turn limewater turbid is .... gas.
   a. oxygen b. carbon dioxide c. nitrogen d. ozone

[B] join from column (A), what is suitable from column (B) :

(A)	(B)
1. Backbone	a. allow movement in all directions.
2. Freely movable joints	b. consists of 33 vertebrae.
3. Slightly movable joints	c. consists of 12 pairs of ribs.
4. Ribcage	d. allow movement in one direction only.
	e. protects the brain.

1. .... 2. .... 3. .... 4. ....

3. [A] Write the scientific term :

1. An organ responsible for reflex action. (........................)
2. The center of the main control in human body. (........................)
3. A gas molecule consists of three atoms of oxygen. (........................)

[B] Correcting the underlined words :

1. The liquid used in medical thermometer is the alcohol. (....................)
2. Nitrogen represents 21 % of the volume of the atmosphere. (....................)
3. Carbon dioxide gas is essential to form rust. (....................)

4. [A] Give reasons for :

Carbon dioxide is used in extinguishing (putting off) fires.

....

....

[B] What happens when ... ?

There is no oxygen in the atmospheric air.

....

....

[C] If an object's mass = 30 kg. on the Earth. Calculate :

1. Its weight on the Earth.

....

2. Its weight on the moon.

....

[D] Study the following figure, then label it :

① ....

② ....

③ ....

④ ....

19 Damitta Governorate — Science Inspectorate

Answer the following questions :

1. Complete the following sentences :

1. The measurement unit of mass is .... , whereas the measurement unit of weight is ....
2. Oxygen is produced from .... process and carbon dioxide is produced from .... process.
3. As the mass of the planet on which the body exists increases, the .... of the planet increases and .... of the body increases.





4. Carbon dioxide is prepared in the laboratory by adding .... to the powder of ....
5. We use .... to measure the boiling point of water , while .... is used to measure the temperature of the patient.
6. The peripheral nervous system consists of .... of cranial nerves and .... of spinal nerves.

---

2. [A] Write the scientific term of each of the following :

1. Automatic response of the body to different stimuli such as light and heat. (..............)
2. Materials that let heat flow through. (..............)
3. The degree of hotness or coldness of a body. (..............)
4. A flame is used in cutting and welding metals. (..............)
5. A gas is used in making soft drinks. (..............)
6. The phenomenon which leads to raise in the Earth's temperature and causes changes in the climate. (..............)

[B] Give reasons for :

1. We must stay away from the source of pollution.
....
2. Oxygen is collected by downward displacement of water.
....
3. Mercury is used in thermometers.
....

---

3. [A] Choose the correct answer :

1. The cerebellum is responsible for ....
   a. thinking. b. the body balance.
   c. the reflex action. d. memory.
2. Myelin sheath surrounds the ....
   a. nerve cell's axon. b. spinal cord.
   c. cerebrum. d. cerebellum.
3. When oxygen combined with an element, the mass of the product is .... the mass of element.
   a. equal to b. less than c. more than d. (a) and (b)



4. The device of measuring weight is ....
   a. the spring scale. b. the balance scale.
   c. one-arm scale. d. two-arms scale.
5. Which of the following is from slightly movable joints ....
   a. thigh. b. wrist. c. ankle. d. knee.
6. Mercury remains in liquid state between .... C°.
   a. (39 : 357) b. (39 : –357) c. (–39 : 357) d. (0 : 100)

[B] Mention the name of the organ that is responsible for :

1. Controlling the voluntary movements of the body.
   ....
2. Protecting the spinal cord.
   ....
3. Protecting the heart and the two lungs.
   ....
4. Protecting the brain parts.
   ....

[C] If an object's mass equals 60 kg. on the Earth's surface. Calculate its mass on the moon's surface ? and why ?

....
....

---

4. [A] What happens in the following cases ?

1. All the bones of the human body are without joints.
   ....
2. The over use of stimulating substances.
   ....
3. A body moves away from the center of the Earth.
   ....

[B] Correct the underlined words :

1. The nodular bacteria fix **oxygen** of air in the roots of leguminous plants. (....................)
2. When the exhaled air passes through clear limewater, it becomes turbid forming a substance called **calcium chloride**. (....................)
3. The axon is covered with a fatty substance called **gray matter**. (....................)



PART 3

20 Fayoum Governorate — Science Supervision for Governmental Language School

Answer the following questions :

1. [A] Complete the following :

1. Oxygen is produced from .... process and carbon dioxide produced from .... process.
2. The number of cranial nerves is .... and the number of spinal nerves is ....
3. The medical thermometer is graduated from .... to ....
4. The .... is the measurement unit of mass , whereas the .... is the measurement unit of weight.

[B] What would happen in the following cases ?

1. There is no oxygen in the atmospheric air.

....

2. The percentage of carbon dioxide in the air increases.

....

2. [A] Correct the underlined words in the following statements :

1. <u>Copper</u> from substances which the heat cannot pass through it. (....................)
2. <u>Nitrogen</u> gas is used in putting off fires. (....................)
3. The nodular bacteria fix air <u>oxygen</u> in roots of leguminous plants such as beans and clover. (....................)
4. <u>Mass</u> is the force of the Earth's gravity to an object. (....................)

[B] Mention one function for each of the following

1. Skull.

....

2. Cartilages between the vertebrae of the backbone.

....

3. [A] Choose the correct answer :

1. Respiration and combustion processes consume .... gas.

a. oxygen b. nitrogen c. argon d. carbon dioxide



2. The weight of the body on the Earth's surface is 6 Newton, so its weight on the moon surface is ....
   a. 1 kg. b. 1 Newton. c. 6 kg. d. 6 Newton.
3. The gas which is used with acetylene in welding metals is .... gas.
   a. oxygen b. nitrogen c. hydrogen d. carbon dioxide
4. Which of the following is from joints ? ....
   a. Femur. b. Shaft. c. Pelvic. d. Knee.

[B] Look at figure, then answer :

- This is structure of ....
- Write the names of parts :
  ① ....
  ② ....

4. [A] Write the scientific term of each of the following statements :

1. A tool is used to measure body weight. (..................)
2. Materials that let heat flow through. (..................)
3. A system responsible for integration and coordination between systems of the human body. (..................)
4. The location of bones meet and allow moving. (..................)

[B] Give reasons for :

1. Yeast is added to the dough on making bread.
   ....
2. Aluminium is used in manufacturing of cooking pans.
   ....

21 El-Minia Governorate — St. Mark and El Tawfik Schools

Answer the following questions :

1. [A] Choose the correct answer :

1. .... nearly equals the mass of one paper clip.
   a. Kilogram b. Gram c. Newton d. Ton
2. Which of the following is faster in conducting heat ? ....
   a. Copper. b. Iron. c. Aluminium. d. Glass.



3. Oxygen is produced from .... process.
   a. burning   b. oxidation   c. photosynthesis   d. respiration
4. The cerebellum is responsible for ....
   a. thinking.   b. the body balance.   c. the reflex action.   d. memory.

[B] Problem :

An object whose mass on the Earth equals 6 kg. Calculate its weight on both surfaces of the Earth and the moon.

....

....

....

2. [A] Complete the following statements :

1. .... and .... are some usages of good heat conductors.
2. Oxygen gas is prepared by the decomposition of .... in the presence of ....
3. Mass is measured by .... scale, whereas weight is measured by .... scale.
4. .... controls the reflex action (reflexes).
5. The percentage of carbon dioxide gas in the atmospheric air is .... and has the symbol ....

[B] Give reasons for the following :

1. Brain is located in the skull.
   ....
2. Carbon dioxide gas is used in extinguishing some fires.
   ....
3. The handles of cooking utensils are made of plastic or wood.
   ....

3. [A] Write the scientific term of each of the following :

1. The force with which a body is attracted to the Earth. (..........................)
2. A rapid union between oxygen and an element producing heat and light. (..........................)
3. The building unit of the nervous system. (..........................)
4. The area of two bones meeting. (..........................)





[B] Compare between the medical thermometer and the Celsius thermometer :

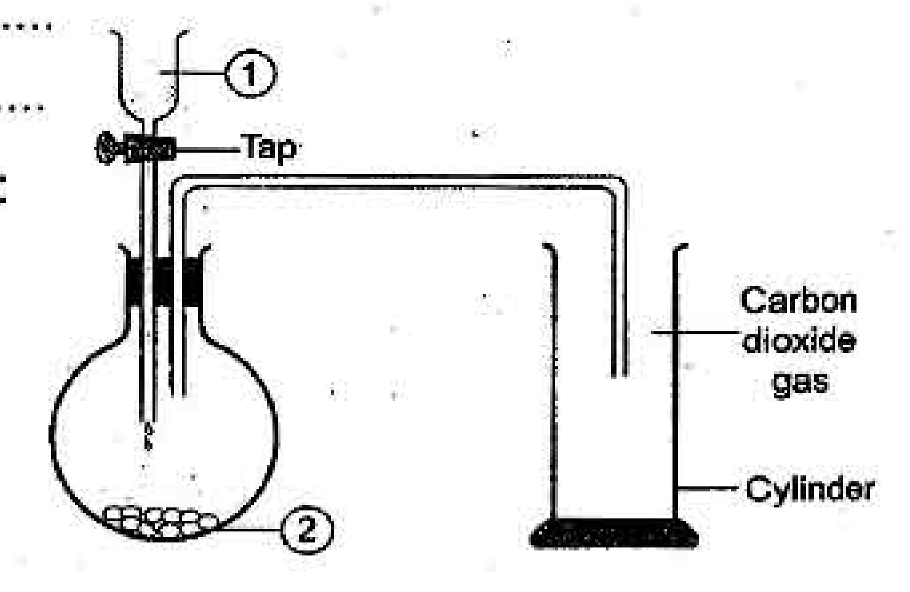
Points of comparison	Medical thermometer	Celsius thermometer
1. Usage :	....	....
2. Structure :	....	....
3. Used liquid :	....	....
4. Scale :	....	....

4. **[A] Correct the underlined wrong words in the following statements :**

1. **All materials** are good conductors of heat. (............)
2. **Ozone** molecule is composed of two hydrogen atoms and one oxygen atom. (............)
3. There are **12 pairs** of spinal nerves and **31 pairs** of cranial nerves. (............)

[B] Look at the following figure, then answer :

1. Write what represents each label :
   - Liquid ① : ....
   - Substance ② : ....



2. Mention three uses of carbon dioxide gas :
   ....
   ....
   ....
3. Carbon dioxide is collected by upward displacement of air. Why ?
   ....

22 Assiut Governorate — Science Inspectorate

Answer the following questions :

1. **Complete the following statements :**

1. The measurement unit of mass is .... or .... , whereas the measurement unit of weight is ....
2. The nervous system divided into .... system and .... system.
3. The graduation of medical thermometer begins from 35°C and ends at .... °C.







PART 3

2. **[A] Put (✓) or (✗) in front of the following :**

1. The spring scale is used for measuring weight. ( )
2. The mass of body changes as its location changes. ( )
3. Celsius thermometer is used to measure the temperature of human being. ( )
4. The spinal cord is responsible for the reflexes. ( )

[B] Give reasons for :

1. Carbon dioxide is used in extinguishing fires.
....
2. The balance scale should be placed horizontally on a stable surface.
....

---

3. **[A] Write the scientific term of each of the following statements :**

1. The gas that exists in the atmosphere and protects the Earth from harmful radiations coming from the Sun. (....................)
2. Materials that let heat flow through. (....................)
3. The building unit of nervous system. (....................)
4. They are 12 pairs of nervous emerging from the brain. (....................)

[B] Mention the function of the following :

1. The flame oxy-acetylene.
....
2. Medulla ablongata.
....

---

4. **[A] Choose the correct answer :**

1. Cerebellum is responsible for ....
   a. thinking. b. balance of the body. c. the reflex action.
2. Nitrogen represents .... of the Earth's atmosphere.
   a. 21 % b. 78 % c. 0.03 %

[B] If an object whose mass on the Earth equals 30 kg. Calculate :

1. Its weight on the Earth.
....
2. Its weight on the moon.
....
3. Its mass on the moon.
....



[C] Look at the opposite figure, then label it :

① ....

② ....

③ ....

④ ....

23 Sohag Governorate — Science Inspectorate

Answer the following questions :

1. [A] Complete the following statement :

1. Mass is measured by ...., whereas weight is measured by ....
2. The scale of the medical thermometer starts from .... °C and ends at .... °C.
3. The number of spinal nerves is .... pairs and the number of cranial nerves is .... pairs.

[B] Choose the correct answer :

1. An object whose weight is 20 Newton on the Earth, its mass is equal to ....
   a. 2 kg. b. 10 kg. c. 20 kg. d. 200 kg.
2. Heat insulators are used in making all of the following except ....
   a. handle of iron. b. cooking pots.
   c. woolen clothes. d. heavy blankets.
3. Which of the following gases have great percentage in the atmospheric air ? ....
   a. Oxygen. b. Carbon dioxide. c. Nitrogen. d. Water vapour.

2. [A] Write the scientific term of each of the following statements :

1. A force with which a body is attracted to the Earth. (..............)
2. A gas used to put off fires. (..............)
3. An organ responsible for the reflex action. (..............)





[B] Mention the function of the following :

1. Celsius thermometer.

   ....

2. Oxy-acetylene flame.

   ....

3. Cerebellum.

   ....

---

3. [A] Correct the underlined wrong words in the following statements :

1. The measuring unit of **mass** is Newton. (....................)
2. Ozone molecule consists of **four** oxygen atoms. (....................)
3. **Nitrogen** gas results from the combustion of organic substances. (....................)
4. **Oxygen** gas is called azote which means lifeless. (....................)

[B] Look at the opposite figure, then answer :

1. Label the numbered bones.
   ① ....
   ② ....
   ③ ....
2. This figure represents the bones of .... limbs.

---

4. [A] Put (✓) in front of the correct statement and (✗) in front of false one :

1. Heat transfers from the cold object to hot object. (   )
2. Oxygen gas occupies 78 % of the atmospheric air. (   )
3. Aluminium is a bad conductor of heat. (   )
4. CO_2 is heavier than air, so it is replaced the air. (   )
5. Legumes such as clover benefit from the nitrogen in the air. (   )
6. Manganese dioxide is used as a catalyst during preparation of oxygen. (   )

[B] Give reasons for :

1. The brain is located inside the skull.

   ....

2. Oxygen gas is collected by downward displacement of water during its preparation in the laboratory.

   ....

3. There are cartilages between the vertebrae of the backbone.

   ....



24 Luxor Governorate — Luxor Educational Zone

Answer the following questions :

1. [A] Complete the following statements :

1. From the substances which are bad conductors of heat .... and ....
2. The mass is measured by .... scale and the weight is measured by .... scale.
3. The number of the cranial nerves is .... and the number of the spinal nerves is ....
4. .... and .... are the sources of carbon dioxide.

[B] Mention the function of each of the following :

1. Celsius thermometer.

....

....

2. Cerebellum.

....

....

2. [A] Choose the correct answer :

1. The gas which turns clear limewater turbid is .... gas.
   a. oxygen b. nitrogen c. carbon dioxide d. ozone
2. The centers of thinking and memory lie in ....
   a. medulla oblongata. b. spinal cord.
   c. cerebellum. d. two cerebral hemispheres.
3. If the weight of a body is 200 Newton, its mass equals ....
   a. 2 kg. b. 20 kg. c. 200 kg. d. 2000 kg.
4. The liquid used in the manufacture of the thermometer is ....
   a. hydrogen peroxide. b. water. c. mercury. d. alcohol.

[B] Give reasons for :

1. Air is the main source of nitrogen.

....

....



PART 3

2. Staying away from the tranquilizers and stimulants.

....

3. [A] Write the scientific term of each of the following statements :

1. The substances that allow heat to pass through. (....................)
2. A bony case that contains brain inside. (....................)
3. An organ responsible for the reflex actions of the body. (....................)
4. A flame is used in cutting and welding metals. (....................)

[B] If a body its mass 60 kg. Calculate its weight on the Earth's surface and also calculate its weight on the moon's surface ?

....

....

....

4. [A] Correct the following statements :

1. The axon of nerve cell is surrounded by gelatinous layer.

....

2. The weight is constant amount and changes as the location changes.

....

3. When a glowing magnesium ribbon is placed in a jar containing oxygen gas, a black substance is formed.

....

4. The maximum and minimum graduation of the clinical thermometer is between (32 : 45) Celsius degrees.

....

[B] What would happen in the following cases :

1. An iron nail wetted by water is exposed several days to humid air.

....

....

2. The percentage of carbon dioxide gas increases in the atmospheric air.

....

....



25 South Sinai Governorate — Tur Sinai Educational Directorate

Answer the following questions :

1. [A] Complete the following statements :

1. Mass is a constant value and it is not affected by changing ....
2. From the functions of the lower limbs ....
3. The graduation of medical thermometer starts from .... to ....
4. The axon of nerve cell is surrounded by ....
5. An object's weight depends on .... and ....

[B] Write one function of :

1. The ribcage.
....
2. Celsius thermometer.
....
3. Balance scale.
....
4. Oxy-acetylene flame.
....

---

2. [A] Put (✓) in front of the correct statements and (✗) in front of false one :

1. Iron is the best heat conductor. ( )
2. Oxygen gas occupies 0.03 % of the atmospheric air components. ( )
3. The skull has immovable joints. ( )
4. A black substance is formed when oxygen reacts with a lighted magnesium ribbon. ( )
5. Cartilages prevent the friction between the bones of vertebrae. ( )
6. The outer surface of the hemispheres is called cerebral cortex and it is a white matter. ( )

[B] If the object's mass = 3 kg. on the Earth surface. Calculate :

1. Its mass on the moon.
....

PART 3

2. Its weight on the Earth.

....

3. Its weight on the moon.

....

[C] Give reasons for :

1. Cooking utensils made of aluminium.

....

2. Oxygen gas is collected by downward displacement of water.

....

3. Yeast is added to dough.

....

3. [A] Choose the correct answer :

1. The used liquid in medical thermometer is ....
   a. water. b. alcohol. c. mercury.
2. We can extinguish fire using .... gas.
   a. oxygen b. nitrogen c. carbon dioxide
3. The device of measuring weight is ....
   a. two-arms scale. b. spring scale. c. digital scale.
4. .... controls the reflex actions.
   a. Spinal cord b. Cerebellum c. Cerebrum
5. Respiration and combustion processes consume .... gas.
   a. oxygen b. nitrogen c. carbon dioxide
6. Which of the following is responsible for keeping the body balance ? ....
   a. Spinal cord. b. Medulla oblongata. c. Cerebellum.

[B] What happens if ... ?

1. Damage of medulla oblongata.

....

2. The percentage of carbon dioxide gas in air increases.

....

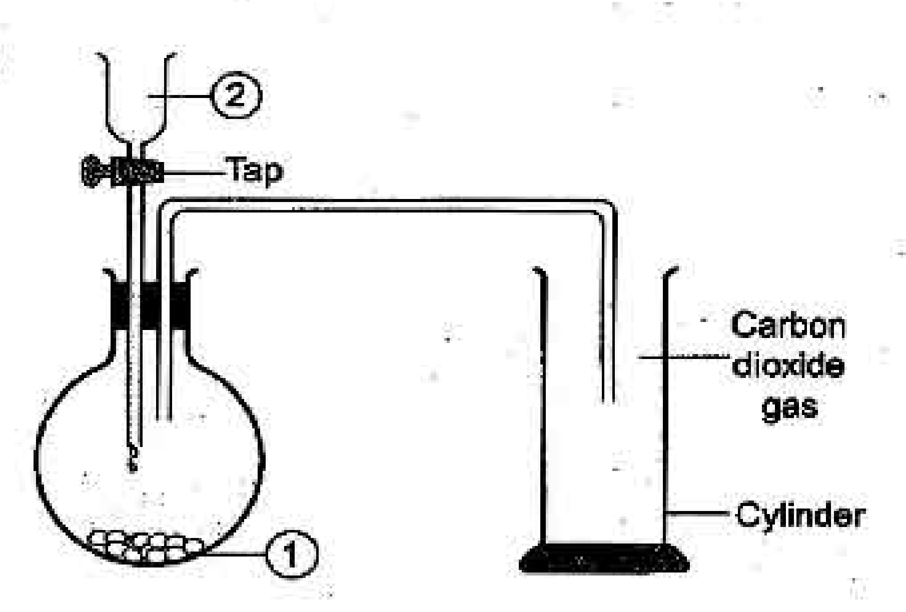
3. There is no constriction above the mercury bulb in the medical thermometer.

....



[C] Look at the following figure , then answer :

1. Substance number ① is ....
2. Liquid number ② is ....
3. From the properties of the evolved gas is ....



4. [A] Write the scientific term of each of the following statements :

1. A gas is used by legumes in formation of their proteins. (..........................)
2. Substances are formed when iron exposed to the humid air for 3 days. (..........................)
3. The measuring unit of mass which equals the mass of one liter of distilled water at the normal temperature. (..........................)
4. Materials that do not let heat flow through. (..........................)
5. The location at which bones meet each other. (..........................)
6. A gas that turns clear limewater into milky. (..........................)

[B] Join from column (A), what is suitable to column (B) :

(A)	(B)
1. The backbone	a. they allow movement in one direction only.
2. Ozone gas	b. they allow movement in all directions.
3. Oxygen gas	c. consists of 33 vertebrae.
4. Nitrogen gas	d. hydrogen peroxide is used in its preparation.
5. Slightly movable joints	e. protects the brain.
6. Freely movable joints	f. protects the Earth from harmful radiation.
	g. it represents 78 % of the volume of the atmospheric air.

1. .... 2. .... 3. ....
4. .... 5. .... 6. ....



Unit One

Lesson 1

1

1. a. mass
2. d. (a) and (b)
3. b. Gram
4. a. Kilogram
5. b. Kilogram
6. c. 500
7. c. spring scale.
8. a. Weight
9. a. Newton
10. c. 100
11. a. the spring scale.
12. c. its mass × 10
13. b. 2 kg.
14. b. increases
15. d. (a) , (b) and (c)
16. b. Earth
17. b. decreases
18. c. 100.
19. d. 10 Newton.
20. b. 10 kg.
21. a. decrease
22. d. 71 Newton.
23. a. 2

2

1. (✗) Mass
2. (✗) equals
3. (✗) variable
4. (✗) Gram
5. (✗) Kilogram
6. (✓)
7. (✗) gold and chemicals.
8. (✗) mass
9. (✗) 1 kilogram.
10. (✗) is equal to
11. (✓)
12. (✗) center
13. (✓)
14. (✗) 20 Newton.
15. (✗) spring scale.
16. (✓)
17. (✗) increases
18. (✗) 10 Newton
19. (✗) increases.
20. (✗) 100 Newton.
21. (✗) decreases

3

1. Mass.
2. Gram.
3. Kilogram.
4. Balance scale.
5. Balance scale.
6. Kilogram.
7. Sensitive two-arms scale.
8. Weight (gravitational force).
9. Weight.
10. Newton.
11. The spring scale.
12. Weight.
13. Mass.

4

1. Mass
2. increases
3. the place.
4. Gram – kilogram
5. Kilogram
6. jewellery – kilogram – fruits
7. two-arms scale – one-arm scale
8. Balance scale – sensitive scale
9. Balance – sensitive two-arms
10. one-arm digital scale – one-arm scale with pointer.
11. the place
12. the center of the Earth.
13. gravitational force.
14. gram – kilogram – Newton.
15. Newton – spring
16. balance – the spring.
17. the object's mass – the planet (place). where the object exists – the distance between the object and the center of the planet.
18. increases.
19. Weight
20. weight – mass
21. one sixths $(\frac{1}{6})$
22. increases
23. center
24. increase – increase.
25. constant - variable
26. the mass – the weight.
27. equals

5

1. Because the mass of the body is a fixed value and it doesn't change by changing the place.
2. Due to the effect of weight (gravitational force).
3. To avoid any vibration of the balance scale.
4. Because the mass of the moon is less than the mass of the Earth, so the gravity of the moon is less than that of the Earth.
5. Because the Earth has greater mass and gravitational force than the moon.
6. Because the weight of the body or any body decreases when the distance between the body or any body and the center of the Earth increases.
7. Because the gravity of a planet depends on its mass, so the weight of any object will change from a planet to another.
8. Because the gravitational force of Earth attracts the hanged body downward, that causes the expand of the wire of spring scale.

6

1. The amount of matter in an object.
2. It is the measuring unit of mass that equals the mass of one paper clip.
3. It is one of the measuring units of mass that equals the mass of one liter of distilled water at the normal temperature.
4. It is the gravitational force by which a body is attracted to the Earth.
5. It is the measuring unit of weight and it is almost equal to the weight of an object on the Earth whose mass is 100 grams.
6. This means that the amount of matter in the small watermelon equals 500 grams.
7. This means that the mass of the body equals 0.1 kilograms.
8. This means that gravitational force of the Earth is six times the gravitational force of the moon.

7

1. The object pulls the wire of the spring downwards and the reading of the pointer increases.
2. Its weight increases.
3. The weight of this object increases.
4. The weight of this object decreases to half.
5. All objects on the Earth's surface don't have weight.
6. The weight of the toy car on the Earth's surface equals 6 times that on the moon's surface.
7. The weight of the person decreases.
8. The weight of the body decreases to 10 Newtons.

8

1. It attracts all the objects towards the center of the Earth.
2. It is used to measure the large masses.
3. It is used to measure small masses as gold and chemicals.
4. It is used to measure the weight of any object.
5. It is used to measure the masses.

9

Points of comparison	Mass	Weight
Definition :	It is the amount of matter in an object.	It is the gravitational force by which the body is attracted to the Earth.
Measuring units :	Kilogram or gram.	Newton.
Measuring devices :	Such as balance scale and sensitive scale.	Spring scale.
The direction of its effect :	Its has no effect.	Its effect is always directed towards the center of the Earth (downwards).
The effect of changing the place :	Constant. (It does not change with changing the place).	Variable (It changes with changing the place).

10

Point of comparison	Balance scale	Spring scale
Use :	It is a device that is used to measure the mass of big object.	It is a device that is used to measure the weight of any object.

11 **The factors affecting weight are :**

1. The object's mass.
2. The planet (place) where the object exists.
3. The distance between the object and the center of the planet.

12

1. The weight of object
   = its mass (kg.) × 10
   = 30 × 10 = 300 Newton.
2. - The weight of object on Earth
   = 6 × 10 = 60 Newton.
   The weight of object on the moon.
   = $\frac{1}{6}$ the weight of object on Earth.
   = $\frac{1}{6} \times 60 = \frac{60}{6} = 10$ Newton.
3. - The mass of liquid = 0.18673 – 0.11976
   = 0.06697 kg
   - The weight of liquid = Mass (kg) × 10
   = 0.06697 × 10
   = 0.6697 Newton.
4. The weight of the object on the moon's surface = $\frac{1}{6}$ that on the Earth's surface
   = $\frac{1}{6} \times 6 = 1$ Newton.
5. a. Its mass on the moon = Its mass on the Earth = 30 kg
   b. Its weight on the Earth
   = Mass × 10 = 30 × 10 = 300 Newton.
   c. Its weight on the moon = $\frac{1}{6} \times 300$
   = 50 Newton.



6. a. The weight of the body on moon
$= \frac{1}{6} \times$ its weight on the Earth
$20 = \frac{1}{6} \times$ its weight on the Earth
The weight on the Earth = 20 × 6
= 120 Newton.
b. Its weight on the Earth = Mass × 10
120 = Mass × 10
Mass = $\frac{120}{10}$ = 12 kg.
7. a. The mass on the moon = 200 gm.
= $\frac{200}{1000}$ = 0.2 kg.
b. The weight on the Earth
= Mass × 10 = 0.2 × 10 = 2 Newton
8. 1. a. Weight on the Earth = Mass × 10
600 = Mass × 10
Mass on the Earth = $\frac{600}{10}$ = 60 kg.
b. Mass on the moon = 60 kg.
c. Weight on the moon
$= \frac{1}{6} \times$ Weight on the Earth
$= \frac{1}{6} \times 600$ = 100 Newton
2. The spring scale is used to measure the weight of an object.

13

1. increases.
2. Weight (N.) = Mass (kg.) × 10

14

1. It is the amount of matter in an object.
2. It is the gravitational force by which a body is attracted to the Earth.
3. Gram or kilogram. 4. Newton.
5. Balance scale.
6. spring scale. 7. It has no effect.
8. Its effect is directed downwards.
9. not affected. 10. affected.

15

1. c 2. d 3. b
4. a 5. e

Timss Questions

1 d. Faucet

2

1. b. less than. 2. a. 285 N.

3 a. No.
b. Because the weight of an object depends on its mass not on its volume, so the brick weighs more than the empty carton box and the apple, because it has the biggest mass.

4 a. It is heavier than cubes 1.3 and 4.

5 - The weight of one small ball
= $\frac{150}{30}$ = 5 Newton.
- The mass of one small ball = $\frac{5}{10}$ = 0.5 kg.

Unit Two

Lesson 1

1

1. c. a hot object to a cold object.
2. a. from hand to ice.
3. a. temperature. 4. b. Thermometer.
5. c. (a) and (b). 6. c. Copper
7. c. glass and wood 8. b. Glass
9. b. it doesn't let heat flow through.
10. b. allows heat to flow through.
11. b. leaving spaces between the railway bars.
12. d.(b) and (c). 13. d.(a) and (c).
14. d. (a) , (b) and (c). 15. a. Copper.
16. b. handles of kettles (boilers).
17. d. (a) and (b). 18. b. plastic.
19. a. body warm.

2

1. (✗) higher temperature object to lower one.
2. (✗) hot object to cold object
3. (✗) Metals 4. (✗) thermometers
5. (✗) Temperature. 6. (✗) aluminium
7. (✗) Iron 8. (✓)
9. (✓) 10. (✓)
11. (✗) Plastic 12. (✓)
13. (✗) insulate 14. (✗) different rate
15. (✗) iron 16. (✗) slower than
17. (✗) aluminium. 18. (✗) wood or plastic.
19. (✗) Iron. 20. (✗) body warm.

3

1. Heat (thermal energy).
2. Heat (thermal energy).
3. Temperature. 4. Temperature

5. Thermometers. 6. Heat conductors.
7. Heat insulators. 8. Copper.
9. Heat conductors 10. Woolen clothes.
11. Heat insulators.

4

1. higher – lower. 2. energy.
3. Warming the house – cooking – drying the washed clothes
4. glass – paper 5. hotness-coldness.
6. Temperature 7. thermometers
8. good – bad
9. Copper – iron – aluminium
10. Paper – plastic – air 11. good
12. Heat conductors 13. Heat insulators
14. Aluminium – a bad heat conductor.
15. the insulating glass windows
16. Copper 17. bad – good
18. Wood – plastic
19. Making cooking pots – making kettles
20. Making heavy blankets – making the handles of cooking pots – making the handles of kettles.
21. Heat insulators – woolen clothes.
22. aluminium – plastic

5

1. Because it is used in :
- Warming the house. - Cooking.
- Heating water.
- Drying the washed clothes.
2. Because it is used in making and processing food, glass , paper , textiles , ...
3. Because they let heat flow through.
4. Because they do not let heat flow through.
5. Because wood doesn't let heat flow through, while copper let heat flow through.
6. To prevent the leakage of heat.
7. To avoid train accidents where, iron is a good heat conductor that expands and twists by heat.
8. Because plastic doesn't let heat flow through, while copper lets heat flow through.
9. Because copper conducts heat faster than aluminium and iron.
10. Because they let heat flow through as they are good conductors of heat.
11. Because they don't let heat flow through as they are bad conductors of heat.
12. Because they are used in making cooking pots (utensils) and kettles that are used in houses and factories.
13. Because it doesn't let heat flow through as it is a bad conductor of heat (insulator).
14. To keep our bodies warm as they prevent the leakage of heat.
15. Because aluminium is a good conductor of heat, while plastic and wood are bad conductors of heat.
16. To keep our bodies warm as they are heat insulators.

6

1. I feel cold due to the transfer of heat from my hands to the piece of ice.
2. I feel hot, due to the transfer of heat from the hot cup of tea to my hands.
3. I feel hot, because copper is a good conductor of heat.
4. I don't feel hot, because glass is a bad conductor of heat (insulator).
5. Heat doesn't transfer from one body to the other as they have the same temperature.
6. Train accidents will occur.
7. We can't hold them with our hands as stainless steel is a good conductor of heat.
8. We can't make handles of cooking pots and also we can't make heavy clothes that keep us warm in winter.

7

1. It is a form of energy that transfers from the higher temperature object to the lower temperature object.
2. It is the degree of hotness or coldness of a body.
3. They are the materials that let heat flow through.
4. They are the materials that do not let heat flow through.

8

1. It is used in :
- Warming the house. - Cooking.
- Heating water.
- Drying the washed clothes.
- Making and processing food, glass, paper, textiles.
2. They are used in making cooking pots (utensils) and kettles.
3. They are used in :
1. Making the handles of :
• Cooking pots. • Kettles.
• Electric iron.
2. Making the heavy blankets and woolen clothes.



4. They are used in making cooking pots (utensils) and kettles.
5. They are used in making the handles of :
   • Cooking pots (utensils).
   • Kettles.
   • Electric iron.
6. They keep our bodies warm as they are heat insulators.
7. It helps us to hold the hot cooking utensils as it is a heat insulator.

9

Heat conductors	Heat insulators
- Copper. - Stainless steel. - Iron. - Aluminium.	- Plastic. - Glass. - Paper. - Wool. - Air. - Wood.

10

1.

Point of comparison	Heat	Temperature
Definition :	It is a form of energy that transfers from the higher temperature object to the lower temperature object.	It is the degree of hotness or coldness of a body.

2.

Points of comparison	Good conductors of heat	Bad conductors of heat
Definition :	They are the materials that let heat flow through.	They are the materials that don't let heat flow through.
Examples :	Copper, aluminium, iron and stainless steel.	Glass, wood, paper, plastic, air and rubber.
Usage :	In making : - Cooking pans. - Kettles.	In making : - The handles of cooking utensils. - The handles of electric iron and kettles. - Heavy blankets and woolen clothes.

11

1. The rod (a), because the pin falls from it faster than the other rod.
2. We conclude that copper conducts heat faster than aluminium.

Timss Questions

1

1. The hand that holds the aluminium spoon.
2. Heat transfers from the hot liquid to the hand through the aluminium spoon as it is good conductor of heat.



2 b. The water gets warmer and the egg gets colder.

3 - Ⓐ - Ⓒ
- Because copper conducts heat faster than aluminium.

Lesson 2

1

1. c. Thermometer
2. b. the change of liquid volume with the change in temperature.
3. b. Medical thermometer.
4. b. constriction.
5. c. mercury. 6. c. 35 °C to 42 °C
7. a. Celsius thermometer.
8. d. (b) and (c) 9. d. mercury.
10. a. 0 °C
11. b. zero °C to 100 °C 12. b. medical
13. b. prevent mercury from returning back to the bulb quickly.
14. a. ethyl alcohol.
15. b. force the mercury back into the bulb.
16. d. increases regularly and expands.
17. c. gives limited extend to measure the temperature.
18. c. (- 39 : 357)
19. b. the presence of constriction in the capillary tube.
20. d. 10
21. c. water

2

1. (✗) using thermometers.
2. (✗) the volume 3. (✓)
4. (✗) constriction 5. (✗) 35 °C to 42 °C
6. (✗) 10 parts. 7. (✗) 35 °C to 42 °C
8. (✗) should sterilize 9. (✓)
10. (✗) medical thermometer.
11. (✗) medical thermometer.
12. (✗) 37 °C
13. (✗) Celsius thermometer.
14. (✗) mercury.
15. (✗) The Celsius thermometer
16. (✗) good conductor. 17. (✗) a wide.
18. (✗) Mercury 19. (✗) zero °C
20. (✗) water boiling. 21. (✗) Mercury

3

1. Thermometer.
2. Medical thermometer.
3. Celsius thermometer.
4. Mercury. 5. Ethyl alcohol.
6. Constriction.
7. Medical thermometer. 8. Digital thermometer.
9. Celsius thermometer. 10. Zero °C
11. 100 °C 12. Mercury.

4

1. Thermometer 2. expand – contract
3. volume – temperature
4. medical thermometer – Celsius thermometer
5. a device used to measure the temperature.
6. medical
7. mercury – a capillary tube
8. constriction 9. medical
10. constriction 11. 35 °C – 42 °C
12. $10 - \frac{1}{10}$ 13. mercury
14. temperature of liquids.
15. a mercury – a capillary tube
16. 0 °C – 100 °C
17. ethyl alcohol – medical.
18. liquid – good
19. stick – capillary tube.
20. measuring the temperature of liquids – measuring the body temperature.
21. Medical – Celsius
22. 0 – 100 23. degree Celsius
24. (– 39 °C) – (357 °C).

5

1. Because the sense of touch helps us to know if the object is hot or cold only, but it can't measure the temperature accurately.
2. To prevent mercury from going back to the bulb quickly in order to read the measurement easily.
3. To sterilize it before using.
4. To force the mercury back to the mercury bulb.
5. Because the used liquid in the thermometer (mercury) is toxic.
6. Because the scale of the medical thermometer ranges from 35 °C to 42 °C and the temperature of iced water is zero °C.
7. Because the scale of the medical thermometer ranges from 35 °C to 42 °C and the boiling point of water is 100 °C.
8. Because mercury is :
   a. A liquid metal that can be seen easily through the thermometer glass.
   b. A good conductor of heat.
   c. A regular expanding material.
   d. Doesn't stick to the walls of the capillary tube.
   e. It gives a wide range to temperature measurement.
9. Because it remains in liquid state between (– 39 °C) and (357 °C).
10. Because liquid expands by heating and contracts by cooling.

6

1. The medical thermometer will be spoiled up (damaged), because the boiling point of water is 100 °C.
2. The mercury will return back quickly to the mercury bulb before determining the temperature reading.
3. The thermometer can't measure the temperature accurately, because water is not a regular expanding material.
4. We can't measure the temperature accurately.
5. We may be infected by some diseases.
6. Mercury will expand regularly.

7

1. They are used to measure the temperature.
2. It is used to measure the human body temperature.
3. It is used to measure the temperature of liquids.
4. It expands and contracts regularly according to the change in temperature, in order to determine the temperature of objects.
5. It prevents mercury from going back to the bulb quickly.
6. It is used to sterilize the medical thermometer.




8
Look at the main book on page (55).

9
1. increases – heating.
2. decreases – cooling.
3. We conclude that the main idea of making the thermometers is the expansion of liquids by heating and their contraction by cooling.

10

Medical thermometer	Celsius thermometer
1. mercury.	1. mercury.
2. 35 °C to 42 °C	2. 0 °C to 100 °C
3. a constriction	3. constriction
4. the human body.	4. liquids.

11
1. ① Constriction. ② Mercury bulb. ③ Capillary tube. ④ Thick glass tube.
2. The medical thermometer – the human body temperature.
3. It prevents the mercury from going back to the mercury bulb to take an accurate reading.
4. 35 °C – 42 °C .

12
1. ① Thick glass tube. ② Capillary tube. ③ Mercury bulb.
2. melting ice – freezing water
3. boiling water.
4. the temperature of liquids.

13 *Look at the main book on page (59).*

Timss Questions

1 - No
- Because the temperature of the boiling water is 100°c, while the scale of the medical thermometer is from 35 °c to 42°c, so the medical thermometer will be spoiled.

2 a. Liquid Ⓒ a. Liquid Ⓑ
c. Celsius thermometer.

3
1. → d → f
2. → c → j
3. → a → i
4. → e → g
5. → b → h

Unit Three

Lesson 1

1
1. c. 21% 2. b. nitrogen
3. d. Carbon dioxide, water vapour and other gases.
4. c. Nitrogen, oxygen and carbon dioxide.
5. d. Ammonia.
6. b. it absorbs ultraviolet radiations.
7. a. photosynthesis 8. b. $\frac{1}{5}$
9. d. (a) , (b) and (c)
10. a. oxygen 11. d. (a) , (b) and (c).
12. b. O_2 13. c. photosynthesis
14. a. oxygen. 15. b. oxygen gas.
16. b. Manganese dioxide.
17. a. water and oxygen. 18. a. Oxygen
19. a. heavier 20. a. scarcely
21. a. more than
22. a. magnesium oxide. 23. c. three.
24. a. burning.
25. b. one oxygen and two hydrogen.
26. a. Oxygen 27. d. (a) , (b) and (c).
28. d. acetylene and oxygen.
29. d. Ozone layer 30. c. 3500° C.

2
1. (✓)
2. (✗) .... two oxygen atoms
3. (✓)
4. (✗) Nitrogen .... 5. (✓)
6. (✗) .... absorbs carbon dioxide .... oxygen gas.
7. (✗) .... of manganese dioxide gas.
8. (✗) Manganese dioxide ....
9. (✗) Hydrogen peroxide decomposes into water and oxygen ....
10. (✗) .... doesn't burn, but helps in burning.
11. (✓) 12. (✓)
13. (✗) .... gas scarcely dissolves ....
14. (✓)
15. (✗) .... increases after ....
16. (✓) 17. (✓)
18. (✗) .... three oxygen atoms.
19. (✗) .... ozone gas ....
20. (✓) 21. (✓) 22. (✓)

3
1. oxygen 2. hydrogen.
3. Oxygen 4. Oxygen
5. water. 6. water
7. white 8. Oxygen
9. Cutting and welding metals.
10. Water 11. two.
12. photosynthesis
13. three oxygen atoms

4
1. Atmosphere. 2. Nitrogen gas.
3. Nitrogen gas. 4. Antoine lavoisier.
5. Oxygen gas. 6. Oxygen gas.
7. Photosynthesis process
8. Oxygen gas. 9. Catalyst.
10. Magnesium oxide. 11. Oxy-acetylene flame.
12. Ozone layer.
13. Dust particles and smoke.
14. Manganese dioxide.
15. Burning (Combustion) process.
16. Oxidation process. 17. Hydrogen peroxide.
18. Oxygen gas. 19. Ozone gas.
20. Oxygen gas.
21. Downward displacement of water.
22. Acetylene gas. 23. Magnesium oxide.
24. Oxy-acetylene flame.

5
1. gases – Earth. 2. gravity.
3. 21 % 4. 1
5. condensation – rain – snow.
6. Carbon dioxide – oxygen.
7. two – ozone
8. green plants – photosynthesis
9. respiration – combustion
10. photosynthesis - respiration.
11. hydrogen peroxide – manganese dioxide.
12. oxygen – water. 13. water.
14. quantity – properties.
15. Antoine Lavoisier 16. water.
17. heavier 18. Oxygen
19. elements oxides.
20. Oxygen – Magnesium oxide.
21. burning. 22. oxidation.
23. iron oxide. 24. Rusting of iron
25. paints – rusting. 26. increases
27. Water. 28. ozone.
29. Mechanical ventilation – respiration
30. Oxygen – iron cylinders 31. decreases
32. oxygen.
33. oxy-acetylene flame.
34. cutting – welding 35. 3500

6
1. Because the consumed oxygen gas during respiration and combustion processes is compensated by the green plants during photosynthesis process.
2. Because they help in the condensation of water vapor in air and falling rains or snow.
3. Because it :
   - Protects the Earth by absorbing ultraviolet radiations coming from outer space.
   - Adjusts the temperature of the Earth's surface.
4. Because oxygen scarcely dissolves in water.
5. Because it acts in this reaction as a catalyst.
6. Because it remains without any change in its quantity and properties during the reaction.
7. Because oxygen is heavier than air.
8. Because oxygen gas helps in burning.
9. Because oxygen combines with iron (cleansing wire) forming iron oxide that its mass is higher than that of iron.
10. Because rusting of iron causes corrosion and damage of ironware such as bridges' pillars.
11. Because iron combines with oxygen of air in the presence of moisture (water) forming a layer of rust that causes corrosion.
12. Because the ratio of oxygen gas decreases when we rise above the Earth's surface.
13. Because the temperature of oxy-acetylene flame reaches 3500°C which is sufficient to cut or melt metals.
14. Because it protects the Earth from harmful radiations that come from the Sun.
15. Because oxygen gas is necessary for respiration under the water surface.
16. To protect them from iron rusting that causes corrosion and damage of the pillars of bridges.

7
Properties of oxygen gas :
- It is a colourless, tasteless and odorless gas.
- It scarcely dissolves in water.
- It doesn't burn, but it helps in burning.
- It is heavier than air.
- It combines with lighted magnesium forming magnesium oxide (white matter).



8

1. It is a mixture of gases surrounding the Earth.
2. It is a rapid combination between oxygen and element producing heat and light.
3. It is a slow combination between oxygen and element in the presence of moisture (water).
4. It is a chemical substance that remains without any change in its quantity and properties during the chemical reaction.

9

1. It protects Earth from the harmful radiations that come from the Sun.
2. It is used in cutting and welding metals.
3. – It protects the Earth by absorbing ultraviolet radiations coming from outer space.
   – It adjusts the temperature of the Earth's surface.
4. It acts as a catalyst.
5. It dissociates in the presence of manganese dioxide into oxygen and water.

10 Hydrogen peroxide is decomposed into water and oxygen gas in the presence of manganese dioxide.

11 *Look at the main book on pages (80 & 81).*

12

1. The ultraviolet radiations will reach the Earth from the outer space, so the temperature of the Earth will be variable.
2. Living organisms cannot respire, so they will die.
3. Iron will combine with oxygen in the presence of moisture (water), so iron nails will rust.
4. The harmful radiations coming from the Sun will reach the Earth and causes harms to living organisms.
5. We cannot control burning processes as oxygen helps in burning.
6. Magnesium oxide which is white matter is formed.
7. The living organisms can't respire and the combustion process doesn't occur.
8. The burning fragment is still burning.
9. It's mass increases after burning due to the combination with oxygen.
10. Hydrogen peroxide is decomposed into water and oxygen gas, while manganese dioxide doesn't change in its quantity or properties.
11. The bridges' pillars will rust causing damage to the bridges.

13

Points of comparison	Oxidation	Burning (combustion)
Definition :	It is a slow combination (union) between oxygen and element in the presence of moisture (water).	It is a rapid combination (union) between oxygen and element producing heat and light.
Example :	Iron rusting.	Burning a piece of cleansing wire.

14

– **Observation :**
Water rises into the cylinder with one fifth of its volume.

– **Conclusion :**
Oxygen gas forms 21 % (or $\frac{1}{5}$) of the volume of atmosphere.

15

① Light energy. ② Carbon dioxide.
③ Nutrients.
④ Water and mineral salts. ⑤ Oxygen gas.

16

a. ① Faucet (tap).
② Hydrogen peroxide.
③ Manganese dioxide.
④ Water. ⑤ Oxygen gas.

b. 1. respiration-combustion processes.
2. decreases as we go up.

c. A gas (oxygen) is obtained at the top of the cylinder.

d. It helps in the decomposition of hydrogen peroxide into oxygen and water as it acts as a catalyst.

e. It is collected by downward displacement of water.
- Because oxygen scarcely dissolves in water.

Timss Questions

1 1. ozone. 2. water
3. oxygen.

2 d. Because this keeps oxygen from reaching the fire.

3 - Figure (a)
- Because gases don't have a definite volume or shape.

Lesson 2

1

1. b. 0.03%
2. c. one carbon atom and two oxygen atoms.
3. d. (a), (b) and (c). 4. c. carbon dioxide.
5. b. CO_2 6. d. (a) and (c).
7. c. carbon dioxide
8. d. all the previous answers.
9. d. carbon dioxide
10. a. calcium carbonate
11. c. carbon dioxide
12. a. upward displacement of air.
13. c. Carbon dioxide 14. b. heavier
15. b. Carbon dioxide gas.
16. c. displacement of water.
17. a. carbon dioxide
18. b. calcium carbonate 19. d. (b) and (c).
20. c. carbon dioxide
21. a. carbon dioxide gas. 22. c. carbon
23. d. soft drinks.
24. d. carbon dioxide gas
25. b. it rarely dissolves in water.
26. a. Making dry ice.

2

1. c 2. d 3. e 4. b

3

1. (✓) 2. (✓)
3. (✗) The increasing of carbon dioxide ....
4. (✗) Carbon dioxide ....
5. (✓) 6. (✗) Tobacco ....
7. (✗) Carbon dioxide ....
8. (✗) .... presence of carbon dioxide gas.
9. (✗) .... into milky. 10. (✓)
11. (✗) .... that insoluble in water.
12. (✓) 13. (✓)
14. (✗) Carbon dioxide is ....
15. (✗) .... white ppt .... 16. (✓)
17. (✗) .... upward displacement of air.
18. (✗) .... with calcium carbonate ....
19. (✓) 20. (✓)
21. (✗) Air is lighter than ....
22. (✗) Carbon dioxide easily .... 23. (✓)
24. (✗) .... it doesn't burn and doesn't help in burning.
25. (✓)
26. (✗) From the characteristics of carbon dioxide ....

4

1. Carbon dioxide. 2. Carbon dioxide.
3. Carbon dioxide. 4. Carbon dioxide.
5. Tobacco. 6. Limewater.
7. Carbon dioxide.
8. Calcium carbonate.
9. Dilute hydrochloric acid.
10. Upward displacement of air.
11. Carbon dioxide. 12. Global warming.
13. Carbon dioxide gas. 14. Carbon dioxide.
15. Carbon dioxide gas.
16. Carbon dioxide gas. 17. Carbon (Coal).
18. Carbon dioxide. 19. Carbon dioxide.
20. Yeast. 21. Carbon dioxide.
22. Fermentation process.

5

1. 0.03 % – CO_2 2. carbon – oxygen
3. respiration – combustion processes
4. Limewater
5. organic – wood – respiration
6. carbon dioxide - oxygen - oxygen - carbon dioxide.
7. Carbon dioxide
8. carbon dioxide 9. carbon dioxide
10. milky (turbid).

11. carbon dioxide gas – calcium carbonate
12. carbon dioxide
13. fuel – carbon dioxide
14. dilute hydrochloric acid – calcium carbonate.
15. Carbon dioxide 16. upward – air – heavier
17. easily dissolves in water.
18. It doesn't burn and doesn't help in burning – it is heavier than air.
19. magnesium oxide – carbon.
20. suffocation of living organisms – global warming.
21. burn – help in burning.
22. Pressure - cooling - dry ice.
23. Carbon dioxide
24. carbon dioxide gas – porous – tasty.
25. carbon dioxide – food – oxygen gas.
26. Carbon dioxide – oxygen

6

1. Because clear limewater turns into milky when carbon dioxide gas passes through it.
2. Because it is heavier than air.
3. Because it easily dissolves in water.
4. Due to the formation of calcium carbonate which is insoluble in water and causes the turbidity of limewater.
5. Because it causes :
   – Suffocation of living organisms.
   – Global warming.
6. Because magnesium reacts with carbon dioxide and produces magnesium oxide which is a white substance and carbon (coal) which is a black substance.
7. Because it increases the percentage of carbon dioxide gas.
8. Because it doesn't burn and doesn't help in burning.
9. Because by adding yeast to dough, carbon dioxide is produced and expanded by heat making the bread porous and tasty.
10. Because during photosynthesis process, the plant produces food and oxygen which is necessary for respiration of all living organisms.

11. Due to :
   – The removal of forests.
   – Combustion of massive amounts of fuel in factories and means of transport.
12. Because carbon dioxide gas is necessary for plants to make photosynthesis process to produce food and oxygen which is necessary for respiration of all living organisms.
13. Because plants take carbon dioxide gas to make photosynthesis process.
14. Because it is used in :
   – Extinguishing fires.
   – Making soft drinks.
   – Making bread.
   – Photosynthesis process.
   – Making dry ice.

7

1. A molecule of carbon dioxide will be formed.
2. Limewater turns into milky due to the presence of carbon dioxide gas in the exhaled air.
3. They will react together and carbon dioxide gas will evolve.
4. The percentage of carbon dioxide gas will increase in air that raises the temperature of atmosphere and causes suffocation of living organisms.
5. – The temperature of the Earth will increase.
   – Living organisms will suffocate.
6. Green plants cannot make photosynthesis process, so the percentage of oxygen will decrease and living organisms will die.
7. The lighted candle will extinguish.
8. Magnesium ribbon keeps burning for a short time producing magnesium oxide which is a white substance and carbon (coal) which is a black substance.
9. Carbon dioxide gas is produced.
10. Dry ice is formed which is used in refrigeration.
11. Carbon dioxide is produced during fermentation, so the bread becomes porous and tasty.
12. This causes osteoporosis and may cause death.




8

- **Observation :** Limewater turns into milky.
- **Conclusion :** Carbon dioxide is produced during respiration of plants.




9

Point of comparison	Oxygen gas	Carbon dioxide gas
Properties :	1. It doesn't burn, but it helps in burning. 2. It scarcely dissolves in water. 3. It is collected by downward displacement of water.	1. It doesn't burn and doesn't help in burning. 2. It easily dissolves in water. 3. It is collected by upward displacement of air.

10

1. – The plant use it to make photosynthesis process.
   – It is used in making bubbled bread, dry ice and soft drinks.
   – It is used in extinguishing fires.
2. It is used to detect the presence of carbon dioxide gas.
3. It is used in refrigeration.
4. Yeast produces carbon dioxide during fermintation which expands by heat making the bread porous and tasty.

11

a. By adding dilute hydrochloric acid on calcium carbonate, where carbon dioxide gas is produced.
b. By burning (combustion) of wood., carbon dioxide gas is produced.

12 The evolved gas is carbon dioxide.

13

It is necessary for photosynthesis process of green plants to make their food.

14

a. – Dilute hydrochloric acid.
   – Calcium carbonate.
b. 1. It is used in extinguishing fires.
   2. It is used in making soft drinks.
   3. It is used in making dry ice.
c. Because it is heavier than air.

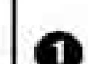
Timss Questions

1 c. consumes oxygen and produces carbon dioxide.

2 - yes
- Because green plants (trees) absorb carbon dioxide gas during photosynthesis process and give out oxygen gas.

3 1. carbon dioxide.
2. It turns into milky (turbid).
3. calcium carbonate.

4 1. extinguish - oxygen.
2. milky (turbid) - carbon dioxide.
3. burning (combustions) - carbon dioxide.



Lesson 3

1

1. b. two 2. d. 78 %
3. c. Daniel Rutherford.
4. c. proteins. 5. a. air.
6. c. oxygen. 7. c. lightning
8. d. (a) or (b). 9. d. (a) and (c)
10. b. downward displacement of water.
11. c. ammonia
12. a. a solution of concentrated sodium hydroxide, then hot copper.
13. d. a white substance and a gas with a very pungent smell.
14. d. (a) and (b). 15. c. ammonia.
16. b. lifeless gas
17. b. inactive element. 18. b. nitrogen.
19. b. nitrogen. 20. d. (a) and (b).
21. b. soil fertilizers. 22. c. Nitrogen
23. c. Nitrogen 24. d. (a), (b) and (c).
25. d. (a) and (b) 26. a. nitrogen.
27. c. the relative constancy in volume when the temperature changes.

2

1. d 2. a 3. c 4. f

3

1. (✗) .... represents 78% .... 2. (✓)
3. (✓)
4. (✗) .... protein substances.
5. (✗) Nitrogen oxide .... 6. (✓)





7. (✓) 8. (✓)
9. (✗) .... absorb carbon dioxide ....
10. (✗) .... absorbs oxygen ....
11. (✗) .... scarcely dissolves in water .
12. (✗) .... doesn't help in ....
13. (✗) .... means lifeless gas 14. (✓)
15. (✗) Nitrogen doesn't react ....
16. (✗) Nitrogen gas .... 17. (✓)
18. (✓) 19. (✓)
20. (✗) Nitrogen gas ....
21. (✗) .... of nitrogen. 22. (✓)
23. (✓) 24. (✓)
25. (✓)

4

1. doesn't react easily
2. nitrogen 3. the atmospheric air.
4. lifeless 5. inactive
6. nitrogen 7. two
8. 78% 9. nitrogen oxide.
10. ammonia 11. liquefied.
12. protein 13. Nitrogen
14. Nitrogen 15. hydroxide
16. hot copper. 17. scarcely
18. pungent 19. Nitrogen
20. nitrogen gas. 21. Nitrogen
22. Nitrogen

5

1. Nitrogen gas. 2. Nitrogen gas.
3. Nitrogen gas. 4. Nitrogen oxides.
5. legumes. 6. nodular bacteria.
7. Atmospheric air. 8. Nitrogen gas.
9. Sodium hydroxide (or potassium hydroxide).
10. Hot copper. 11. Nitrogen gas.
12. Liquefied nitrogen.
13. Ammonium nitrate and ammonia.
14. Nitrogen gas. 15. Nitrogen gas.
16. Nitrogen gas. 17. Nitrogen gas.
18. Nitrogen gas.

6

1. a gaseous 2. two – N_2
3. 78 – tissues. 4. Nitrogen
5. nitrogen oxides.
6. clover – peas – protein

7. bacteria – roots of legumes.
8. Daniel Rutherford
9. atmospheric air.
10. concentrated sodium hydroxide or potassium hydroxide.
11. hot copper. 12. water.
13. burning.
14. a white substance – ammonia
15. doesn't help in burning.
16. soil fertilizers. 17. scarcely
18. Nitrogen 19. Nitrogen.
20. car tires.
21. treatment for skin tumors – cooling food products.
22. nitrogen 23. Nitrogen
24. Nitrogen
25. ammonium nitrate – ammonia
26. Nitrogen 27. Nitrogen gas
28. stainless steel.

7

1. Because it forms protein which is necessary for building up living tissues.
2. Because legumes need nitrogen gas to form protein by the help of special type of bacteria (nodular bacteria) that live in their roots.
3. Because it contributes in the composition of all living tissues as it forms protein substances.
4. To absorb the small amount of carbon dioxide gas from the atmospheric air.
5. To remove oxygen gas from atmospheric air.
6. Because nitrogen is scarcely soluble in water.
7. Because nitrogen doesn't help in burning.
8. Due to the formation of ammonia gas which has a very pungent smell.
9. Because nitrogen gas doesn't help in burning.
10. Because it causes relative constancy of the volume of car tires when the temperature changes.
11. To preserve them to be transfer easily.
12. Because nitrogen forms 78% of the volume of atmospheric air.
13. Because nitrogen is inactive element.
14. Because nitrogen is inactive element.

8

1. The protein substance that builds up the bodies of all living organisms is not formed.
2. Sodium hydroxide or potassium hydroxide will absorb carbon dioxide and remove it from the atmospheric air.
3. Hot copper combines with oxygen gas and remove it from the atmospheric air.
4. A white substance is produced and reacts with water forming ammonia gas with a very pungent smell.
5. It freezes quickly and becomes solid.
6. The protein substance that builds up the bodies of all living organisms is not formed.
7. Nitrogen oxides are formed, where they reach the soil with rain water.
8. Legumes as clover, peas and soybeans can't make protein.
9. Nitrogen gas will be changed into a liquid state forming liquefied nitrogen.

9

1. Pass the air through a solution of concentrated sodium hydroxide or potassium hydroxide to absorb the small amount of carbon dioxide from air.
   - Then pass the air over hot copper to remove oxygen from the air.
   - Collect nitrogen gas by downward displacement of water.
2. Put a lighted magnesium ribbon in a cylinder filled with nitrogen.
   - A white substance is produced.
   - Add a little amount of water to the produced white substance.
   - A very pungent smell emits due to the formation of ammonia gas.

10

Look at the main book on page (124).

11

Point of comparison	Oxygen gas	Nitrogen gas
Combustion :	It doesn't burn, but it helps in burning.	It doesn't help in burning.

12

1. They take atmospheric nitrogen and convert it into protein.
2. It absorbs the small amount of carbon dioxide gas from air.
3. It removes oxygen from air.
4. It is used in the treatment of skin tumors.

13

a. - It represents 78 % of the volume of atmosphere.
   - It reacts with oxygen during lightning forming nitrogen oxide that reaches soil during raining.
   - legumes convert nitrogen into protein through a specific type of bacteria live in their roots.
   - It forms protein substance that builds up the body of all living organisms.

b. - It is used in the manufacture of :
   - Gunpowder. - Electronic devices.
   - Stainless steel. - Ammonia.
   - Fertilizers.

14

a. ① Concentrated sodium hydroxide or potassium hydroxide.
   ② Hot copper.
   ③ Nitrogen gas.

b. nitrogen gas.

c. To absorb carbon dioxide gas and remove it from the atmospheric air.

d. To combine with oxygen and remove it from the atmospheric air.

e. downward – it scarcely dissolves in water.

Timss Questions

1 1. ② 2. ① 3. ③
4. azote 5. ①

2 1. A white substance is formed in the two cylinders.
2. - Add a little amount of water to the produced white substance.
   - A very pungent smell emits from the cylinder which (contains) nitrogen gas due to the formation of ammonia gas.

3 c. Gas Ⓐ is nitrogen, gas Ⓑ is carbon dioxide and gas Ⓒ is oxygen.





Unit Four

Lesson 1

1

1. c. nervous
2. a. neuron.
3. c. dendrites.
4. c. synapse
5. d. (a), (b) and (c).
6. c. myelin sheath
7. c. dendrites.
8. a. nerve cell's axon.
9. d. (a) and (b).
10. a. spinal nerve.
11. c. spinal nerves.
12. b. skull
13. d. (a) , (b) and (c).
14. c. cerebrum
15. d. two cerebral hemispheres.
16. d. gray.
17. a. two cerebral hemispheres.
18. d. Cerebellum
19. c. Medulla oblongata
20. b. the body balance.
21. a. regulating the heartbeats.
22. a. medulla oblongata.
23. d. cerebral hemispheres.
24. b. vertebral column.
25. d. spinal cord.
26. c. maintaining the balance of the body.
27. a. Spinal card
28. a. H
29. b. opposite
30. c. medulla oblongata.
31. b. Peripheral nervous system
32. c. 12
33. a. 31
34. c. reflex action.
35. c. breathing.
36. a. spinal cord.
37. d. smoking cigarettes.
38. d. (a) , (b) and (c)

2

1. e – 2. d – 3. a – 4. c – 5. g – 6. f – 7. b

3

1. (x) nervous system
2. (x) nerve cell
3. (x) axon.
4. (x) dendrites.
5. (x) axon terminals.
6. (x) myelin sheath.
7. (✓)
8. (x) brain
9. (x) skull
10. (✓)
11. (✓)
12. (x) gray matter.
13. (✓)
14. (x) cerebral cortex.
15. (x) two cerebral hemispheres.
16. (x) cerebrum.
17. (x) below
18. (✓)
19. (x) in front of
20. (✓)
21. (x) medulla oblongata.
22. (✓)
23. (x) gray
24. (✓)
25. (✓)
26. (x) 31 pairs .... 12 pairs
27. (x) Medulla oblongata
28. (x) an involuntary

4

1. The nervous system.
2. The nervous system.
3. The nervous system.
4. Nerve cell (Neuron).
5. Dendrites.
6. The axon.
7. The myelin sheath.
8. Synapse (synaptic area).
9. The central nervous system.
10. The brain.
11. Cerebrum.
12. Cerebral cortex (gray matter).
13. The cerebrum.
14. The two cerebral hemispheres.
15. Cerebellum.
16. Cerebellum.
17. Medulla oblongata.
18. The cranial nerves.
19. The spinal nerves.
20. The peripheral nervous system.
21. The spinal cord.
22. The reflex action.
23. The gray matter.
24. The spinal cord.
25. The nerve cell (neuron).
26. The medulla oblongata.
27. The spinal cord.
28. The reflex a :tion.
29. The skull.
30. Addiction.

5

1. The nervous system
2. nerve – neuron.
3. Neuron
4. the cell body – the axon.
5. a nucleus – cytoplasm – dendrites
6. the synapse.
7. myelin
8. axon terminals – a synapse
9. central nervous system – peripheral nervous system.
10. the brain – the spinal cord.
11. the brain – skull
12. nerve cells
13. the central nervous system.
14. The skull
15. cerebrum – cerebellum – medulla oblongata.
16. a gray – a white
17. cerebrum – the two cerebral hemispheres.
18. the skull
19. convolutions – folds
20. voluntary – running in races.
21. The two cerebral hemispheres
22. thinking – memory.
23. cerebellum
24. cerebellum
25. medulla oblongata
26. medulla oblongata.
27. medulla oblongata – movement of the respiratory system parts during breathing.
28. backbone.
29. spinal cord
30. The spinal cord
31. a gray – a white
32. letter "H" – the white matter.
33. the peripheral nervous system.
34. cranial – spinal.
35. 12 pairs – 31 pairs
36. reflex action
37. The spinal cord – the medulla oblongata
38. The peripheral – the central nervous system
39. reflex action.
40. reflex action.
41. nervous tension – affects heartbeats
42. tranquilizers

6

1. To connect the neuron's body with the neighbouring neurons forming synapse.
2. To form a synapse with other neurons or to connect with the muscles.
3. Because it directs and coordinates all the processes, ideas, behaviours and emotions.
4. To protect it.
5. Because it controls the voluntary movements as running in races.
6. Because it is responsible for regulating the involuntary processes as :
   - Regulating the heartbeats.
   - Regulating the movement of the respiratory system parts during breathing.
7. Because it :
   - Controls the voluntary movements of the body as running in races.
   - Receives nerve impulses from sense organs and sends the suitable responses to these impulses.
   - Contains the centers of thinking and memory.
8. Because it maintains the balance of the body during its movement.
9. Because it regulates the movements and functions of the digestive system's organs.
10. To protect it.
11. Because medulla oblongata controls all the involuntary processes (as heartbeats, movement of the respiratory system parts during breathing, movement and functions of the digestive system).
12. To maintain the nervous system healthy.
13. To maintain the nervous system healthy.
14. To maintain the nervous system healthy as they affect the sleeping periods, the heartbeats and lead to nervous tension.
15. To maintain the nervous system healthy.
16. To maintain the nervous system healthy.
17. Due to the reflex action made by the spinal cord.
18. Because it causes retardation of memory and learning, nervous tension, sluggishness, loss time sensation and sleepless.
19. Because :
    1. It carries the nerve messages from one of the body areas to another.
    2. It regulates and coordinates all the vital processes within the body.
    3. It receives the external stimuli that surround the human being through the sensory organs, then identifies and interprets them.

7

1. The synapses are not formed.
2. All the involuntary processes of the body will be disturbed causing death.
3. The body will lose its balance.
4. The withdrawal of your hand will occur quickly.
5. The blinking of the eyelashes will occur.
6. The withdrawal of your hand will occur quickly.
7. The nervous system will be exhausted.
8. The nervous system will be exhausted.
9. The nervous system will be exhausted.







1 Part

10. The nervous system will be exhausted as they lead to nervous tension and affect the heartbeats and the sleeping periods.
11. The nervous system will be harmed.
12. It will cause sleepless, nervous tension, sluggishness, retardation of memory and learning.

8

1. It is the building unit of the nervous system.
2. It is the main control center in the body as it directs and coordinates all the processes, ideas, behaviours and emotions.
3. - It controls the voluntary movements of the body.
   - It receives the nerve impulses from the sense organs and sends the suitable responses to these impulses.
   - It contains the centers of thinking and memory.
4. They form synapses with the neighbouring neurons.
5. It maintains the balance of the body during movements.
6. It is responsible for regulating the involuntary processes of the body as :
   - Regulating the heartbeats.
   - Regulating the movement of the respiratory system parts during breathing.
   - Regulating the movements and functions of the digestive system.
7. - It delivers the nerve messages from the body organs to the brain and vice versa.
   - It is responsible for the reflex actions.
8. It delivers the sensory information and the kinetic responses between the central nervous system and all parts of the body.
9. It protects the body from many dangers.
10. It protects the brain.
11. It protects the spinal cord.
12. – It carries the nerve messages from one of the body areas to another.
   – It regulates and coordinates all the vital processes within the body.
   – It receives the external stimuli that surround the human being through the sensory organs, then interprets them.

9

1. It is a communication and controlling body system.
2. It is the building (or basic structure) unit of the nervous system.
3. It is a nerve block containing millions of nerve cells (neurons) and it is the main control center in your body.
4. It is the nerves which emerge from the central nervous system (brain and the spinal cord).
5. It is the automatic response of the body to different stimuli.

10

1. Inside the skull. 2. In the brain.
3. At the back area of the brain below the two cerebral hemispheres.
4. In the brain in front of the cerebellum.
5. In a channel within a series of vertebrae in the backbone.
6. In the inner part of the spinal cord.
7. At the outer surface of the two cerebral hemispheres.
8. Extend from the cell body of the neuron.
9. At the end of the axon.



11

1.

Points of comparison	The brain	The spinal cord
- Definition :	It is a nerve block containing millions of nerve cells and it is the main control center in your body.	It is a cylindrical cord from which the spinal nerves extend.
- Location :	It is located in a bony box called skull.	It extends in a channel within a series of vertebrae in the backbone.
- Function :	It directs and coordinates all the processes, ideas, behaviours and emotions.	– It delivers the nerve messages from the body organs to the brain and vice versa. – It is responsible for the reflex actions.

2.

Spinal cord	Two cerebral hemispheres
The outer surface is a white matter, while the inner surface is a gray matter has the shape of letter "H"	The outer surface is a gray matter, while the inner surface is a white matter.

3.

Points of comparison	Cranial nerves	Spinal nerves
Definition :	• They are nerves that emerge from the brain.	• They are nerves that emerge from the spinal cord.
Number :	• 12 pairs.	• 31 pairs.

4. *Look at the main book on page (155).*



12

1. The human nervous system.
2. ① The brain. ② The spinal cord. ③ Nerves.
3. – The function of part no. ① :
   It directs and coordinates all the processes, ideas, behaviours and emotions.
   – The function of part no. ② :
   • It delivers the nerve messages from the body organs to the brain and vice versa.
   • It is responsible for the reflex actions.

13

1. The structure of the spinal cord.
2. (a) The white matter. (b) The gray matter.
3. spinal cord.

14

1. the nerve cell (neuron).
2. – cell body.
   – axon.
3. (1) Nucleus. (2) Dendrites.
   (3) Cytoplasm. (4) Myelin sheath.
   (5) Axon terminals.

15

1. (1) Cerebrum (two cerebral hemispheres).
   (2) Cerebellum.
   (3) Medulla oblongata.
2. It maintains the balance of the body during the movement.

16

Look at the main book on pages (153 & 154).



Times Questions

1 b. cerebrum - cerebellum - medulla oblongata.

2 b ⟶ e ⟶ a ⟶ c ⟶ d

3 c. Part ① is medulla oblongata, part ② is cerebrum and part ③ is spinal card.

Lesson 2

1

1. b. Movement 2. d. (a) , (b) and (c).
3. a. axial skeleton. 4. c. the limbs bones.
5. b. brain. 6. d. 33
7. a. spinal cord. 8. c. spinal cord.
9. b. 12
10. d. (a) and (b). 11. c. breathing.
12. b. sternum 13. a. upper limb.
14. a. shoulder. 15. b. pelvic
16. c. upper limbs 17. b. joint.
18. a. two bones. 19. a. immovable.
20. d. slightly movable. 21. d. Vertebrae.
22. b. thigh 23 . d. Knee.
24. c. Elbow. 25. d. blood vessels
26. a. Tendons 27. d. D
28. c. carrying heavy things that exceed your ability.
29. c. D

2

1. d 2. e 3. c 4. b
5. a 6. f 7. g

3

1. (✓) 2. (✓)
3. (✗) 33 vertebrae. 4. (✗) 12 pairs of ribs.
5. (✓) 6. (✗) cartilages.
7. (✓) 8. (✗) spinal cord





9. (✗) bones of upper limbs.
10. (✗) Joints. 11. (✗) Tendons.
12. (✗) immovable.
13. (✗) a freely movable
14. (✗) a slightly movable
15. (✗) bones of upper limbs and bones of lower limbs.
16. (✗) Freely movable 17. (✓)
18. (✗) involuntary
19. (✗) a slightly movable.
20. (✗) involuntary 21. (✓)

4

1. The locomotory system.
2. Locomotory system. 3. Skeletal system.
4. Axial skeleton. 5. Axial skeleton.
6. Backbone. 7. Skull.
8. Backbone. 9. Ribcage.
10. Backbone. 11. Ribcage.
12. Backbone.
13. Appendicular skeleton. 14. Cartilages.
15. Joint. 16. Immovable joint.
17. Slightly movable joint.
18. Freely movable joint.
19. Muscular system. 20. Tendons.
21. Joints.
22. Involuntary muscles. 23. Vitamin D.

5

1. the movement.
2. skeletal – muscular – nervous
3. the skeletal system - the muscular system.
4. axial skeleton – appendicular skeleton.
5. the skull – the backbone – the ribcage.
6. The skull – cavities. 7. protect the brain.
8. 33 9. Cartilages.
10. friction – motion.
11. 12 – ribs. 12. sternum
13. lungs – heart. 14. Ribcage
15. upper limbs – lower limbs.
16. humerus bone – forearm bones – hand bones.
17. femur bone – shaft bones – foot bones.
18. joint
19. immovable joints – slightly movable joints – freely movable joints.
20. allow the movement between bones.
21. slightly movable – freely movable.
22. knee - shoulder.
23. mechanical 24. tendons.
25. contraction – relaxation
26. involuntary muscles – voluntary muscles.
27. contract – relax. 28. relaxes – up
29. voluntary muscles.
30. The limbs muscles - trunk muscles.
31. jumping from high places – making violent movements.
32. vitamin D.
33. calcium – phosphorus.



1. Because it helps in moving from a place to another seeking for benefit or away from harm.
2. To protect the brain.
3. To prevent the friction between vertebrae during motion.
4. Because it allows the body to bend in different directions and it protects the spinal cord.
5. To protect them.
6. Because it allows the movement in one direction only.
7. Because it allows the movement in all directions.
8. Because they don't allow any movement.
9. Because muscles generate the mechanical energy that moves the body.
10. Because the contraction and relaxation of the muscular cells generate the mechanical energy that moves your body.
11. Due to the presence of tendons that fix muscles with bones.
12. To fix muscles with the bones.
13. Because these muscles can move willingly and you can control its movement.
14. Because these muscles work automatically and you can't control or even aware of their movements.
15. Because you can't control its movement.
16. To prevent bone diseases such as osteomalacia and rickets.
17. To protect the skeleton, especially the backbone.
18. To avoid straining of the neck or backbone vertebrae.
19. Because the sunlight is very important in providing the body with vitamin D.



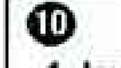
1. The human body can't move.
2. The human body can't move.
3. The lower limbs will move in one direction only.
4. The two upper limbs will move in one direction only.
5. The human body can't bend in different directions.
6. The body can't move with the contraction and the relaxation of muscles.
7. The arm moves down.
8. The body may be injured by fractures and strains.
9. Friction takes place between the vertebrae causing harms to the backbone.



1. It protects the brain.
2. a. It allows the body to bend in different directions.
   b. It protects the spinal cord.
3. a. It protects the lungs and the heart.
   b. It helps in the inhalation and exhalation processes.
4. They allow eating, drinking, writing and holding things.
5. They allow walking, running, standing and carrying the rest of the body.
6. They allow the movements between bones.
7. They allow the movement of bones in one direction only.
8. They allow the movement of bones in all directions.
9. It generates the mechanical energy that moves the body.
10. It fixes the muscles with bones.
11. When it contracts, it causes the bending (moving up) of the arm.
12. When it contracts, it causes the extending (moving down) of the arm.
13. They prevent the friction between vertebrae during motion.



1. It is the location at which bones meet each other.
2. They are the joints that don't allow any movement between bones.
3. They are the muscles that can move willingly and you can control its movement.
4. They are the muscles that can move automatically and you can't control or even aware of their movements.



1. Immovable joints.
2. Slightly movable joint.
3. Slightly movable joint.
4. Freely movable joint.
5. Freely movable joint.
6. Freely movable joint.

11

1. axial – upper
2. ① Humerus. ② Forearm bones.
   ③ Hand bones. ④ Ribcage.
   ⑤ Backbone ⑥ Skull.
   ⑦ Backbone.
3. - Function of ④ :
   a. It protects the lungs and the heart.
   b. It helps in inhalation and exhalation processes.
   - Function of ⑤ :
   a. It allows the bending of the body in different directions.
   b. It protects the spinal cord.
   - Function of ⑥ :
   It protects the brain.





4. ⓐ Shoulder joint ⟶ freely movable joint.
ⓑ Elbow joint ⟶ slightly movable joint.

⓬
Look at the main book on pages (179 & 180).

⓭
(a) ① Humerus. ② Forearm bones.
③ Front arm muscle.
④ Back arm muscle.

(b) - In fig. (a) : The front arm muscle contracts and the back arm muscle relaxes causing the bending (moving up) of the arm.
- In fig. (b) the front arm muscle relaxes and the back arm muscle contracts causing the extending (moving down) of the arm.

⓮
1. lower
2. ① Femur.
② Shaft bones.
③ Foot bones.
3. It allows walking, running, standing and carrying the rest of the body.
4. ⓐ Thigh (hip) joint ⟶ Freely movable joint.
ⓑ Knee joint ⟶ slightly movable joint.

⓯
1. Voluntary muscles.
2. Involuntary muscles.
3. Voluntary muscles.
4. Involuntary muscles.
5. Involuntary muscles.

⓰
1. skull.
2. immovable joints.
3. protecting the brain.

⓱
1.

Axial Skeleton	Appendicular Skeleton
It is composed of the skull, the backbone and the ribcage.	It is composed of bones of upper limbs and bones of lower limbs.

2.

Points of comparison	Voluntary muscles	Involuntary muscles
Definition :	They are the muscles that can move willingly and you can control its movement.	They are the muscles that can move automatically and you can't control or even aware of their movement.
Examples :	- Limbs muscles. - Trunk muscles. - Face muscles. - Abdominal wall muscles.	- Gastrointestinal tract. - Blood vessels. - Bladder muscles.

3.

Wide (Freely) movable joints	Limited (Slightly) movable joints
- They allow movement in all directions.	- They allow movement in one direction only.
ex. Shoulder joint.	ex. Knee joint.

4.

The upper limbs	The lower limbs
- They are connected to the shoulder bones.	- They are connected to the pelvic bones.
- They are humerous bone, forearm bones and hand bones.	- They are femur bone, shaft bones and foot bones.
- They allow eating drinking and holding things.	- They allow walking, running and sitting.

Timss Questions

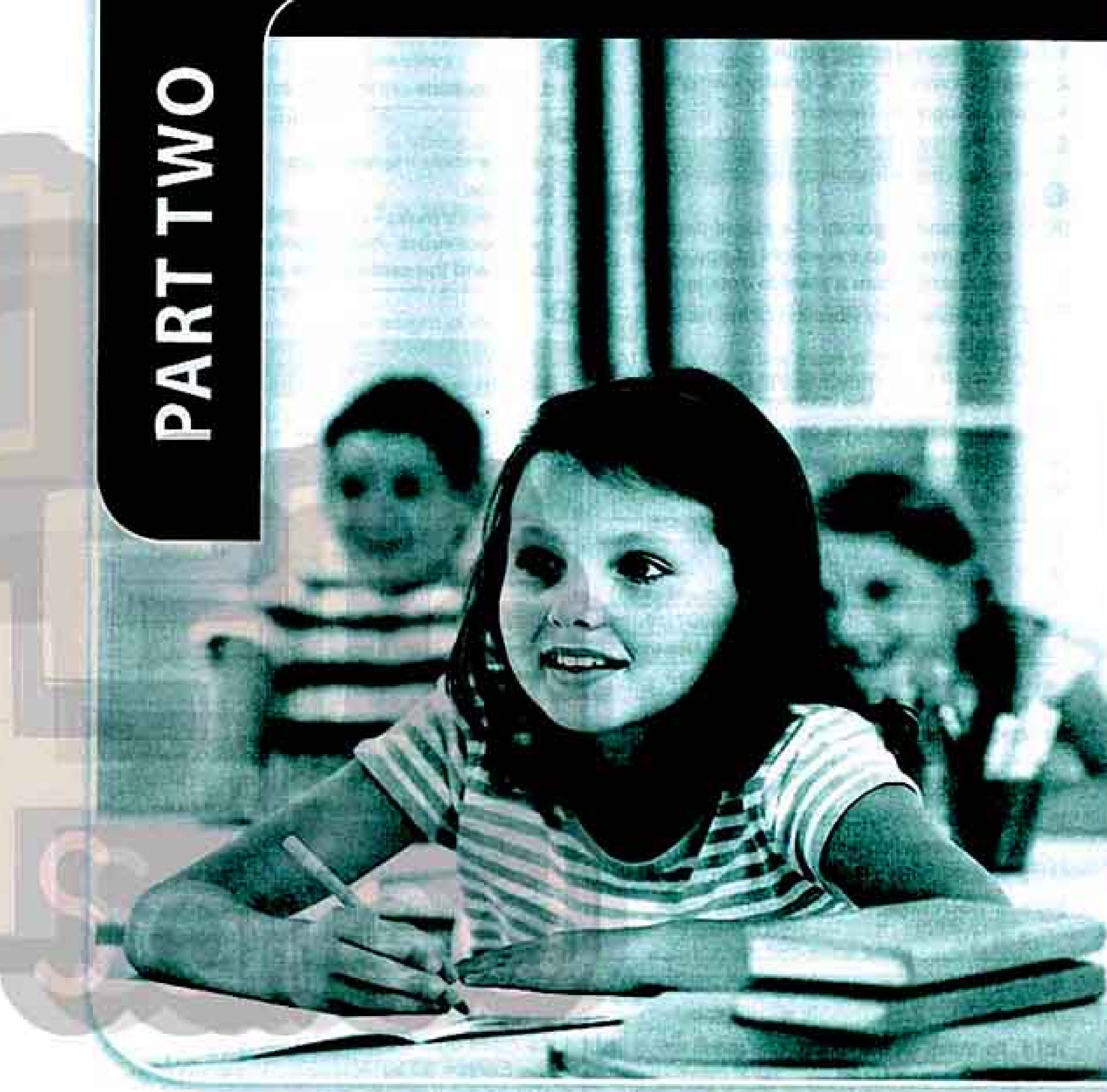
❶ 1. The ribcage. 2. The backbone.
3. The skull. 4. The ribcage.

❷ b. Milk. d. Cheese. e. Egg.

❸
a. (✓) b. (✗)
c. (✗) d. (✗)
e. (✓) f. (✓)

PART TWO

Guide Answers of Test yourself






Test yourself 1



1

1. Balance scale - spring scale
2. weight - mass 3. gravity - weight
4. gram - kilogram - Newton
5. $\frac{1}{6}$

2

[A] 1. Because the gravity of a planet depends on its mass, so the weight of any object will change from a plant to another.
2. To prevent any vibration of the balance scale.
3. Because the weight of the person decreases as the distance between the person and the center of the Earth increases.

[B] 1. (✓) 2. (✗) 3. (✗) 4. (✗)

3

[A]

30 kg.	1 kg.	3000 gm.
300 Newton	10 Newton	30 Newton

[B] 1. Sensitive two arm scale.
2. Kilogram.

4

[A] 1. It is the gravitational force by which the body is attracted to the Earth.
2. It is the amount of matter in an object.

[B] 1. a. decreases. 2. d. spring scale.
3. b. 10

5

[A] 1. d 2. b 3. a 4. c

[B] 1. Its mass on the moon = Its mass on the Earth = 60 kg.
2. Its weight on the Earth = Mass × 10
= 60 × 10 = 600 Newton.
3. Its weight on the moon
= $\frac{1}{6}$ × 600 = 100 Newton

1

1

1. d. spring scale. 2. b. 2 kg.

2

1. balance scale - spring scale.
2. the place.
3. the object's mass - planet (place) where the object exists - the distance between the object and the centre of the planet.

3

Points of comparison	Mass	Weight
- Definition :	The amount of matter in an object.	The gravitational force by which the body is attracted to the Earth.
- Unit of measurement :	Kilogram or gram.	Newton.
- Device of measurement :	Balance scale – Sensitive two arms scale – one arm digital scale – one arm scale with a pointer.	Spring scale.
- Direction :	It has no effect.	Its effect is always directed towards the center of the Earth (downwards).
- Effect of different places :	Constant. (It does not change with changing the place).	Variable (It changes with changing the place).

4

1. Its mass on the moon = Its mass on the Earth = 30 kg
2. Its weight on the Earth
= Mass × 10 = 30 × 10 = 300 Newton.
3. Its weight on the moon = $\frac{1}{6}$ × 300
= 50 Newton.

1 1

1

1. one paper clip - small - jewellery
2. a constant - the place of the matter.
3. Newton - the Earth's - 100
4. Its mass 5. spring scale

2

[A] 1. a. decreases 2. b. 20 Newton.
3. a. smaller than 4. c. 5 kg.

[B] 1. This means that the mass of this person equals 70 kg.
2. This means that the weight of this watermelon equals 20 Newton.

3

[A] 1. (✗) 2. (✓) 3. (✗) 4. (✓)

[B]

Points of comparison	Mass	Weight
Measuring devices :	- Balance scale. - Sensitive two arm scale. - One arm digital scale. - One arm scale with a pointer.	Spring scale.
The effect of changing the place :	Constant (it does not change with changing the place).	Variable (it changes with changing the place and changes from a planet to another.

4

[A] 1. gram or kilogram 2. Newton

[B] 1. Fig. (a) : Balance scale.
Fig. (b) : Sensitive two arms scale.
2. Sensitive two arms scale is used to measure small masses as gold and chemicals.

5

[A] 1. Because the Earth has greater mass and gravitational force than the moon.
2. Because the mass of any matter is a constant value and it does not change by changing the place of matter.

[B] 1. Weight of the object on the Earth's surface
= 6 × weight on moon = 6 × 8 = 48 Newton.
2. Mass of the object
= $\frac{\text{Weight of the object on Earth's surface}}{10}$
= $\frac{48}{10}$ = 4.8 kg.

2 1

1

1. d. (a) , (b) and (c). 2. b. 0.1 kg.
3. a. decreases. 4. a. 6
5. c. 36 kg.

2

[A] 1. Because the mass of the Earth is more than that of the moon.
2. Because the gravitational force of the Earth attracts the hanged body downward, that causes the expand of the wire of spring scale.

[B] 1. Gram 2. mass
3. equal to 4. Newton

3

[A] 1. Mass. 2. Weight.

[B] 1. The object's mass.
2. The planet (place) where the object exists.
3. The distance between the object and the center of the planet.

4

[A] 1. The weight of your body on the moon will decrease to $\frac{1}{6}$ of the weight of your body on the Earth.
2. All objects on the Earth's surface don't have weight.

[B] 1. Balance scale. 2. Spring scale.
3. Sensitive two-arms scale.

5

1. Weight on Earth = mass × 10
480 = mass × 10
mass on Earth = $\frac{480}{10}$ = 48 kg.
2. Its mas on the moon = 48 kg.
3. Weight on the moon = $\frac{1}{6}$ × weight on Earth.
= $\frac{1}{6}$ × 480 = 80 newton.



2 Part

Test yourself 2

1
1. hotness - coldness
2. bad - good.
3. metals - good
4. insulating - wood
5. energy - thermometer.

2
[A] 1. Because copper allows heat to flow through , while wood doesn't allow heat to flow through.
2. Because aluminium is good conductor of heat.
3. To keep our bodies warm as they are heat insulators.

[B] 1. (✗) different.
2. (✗) hot object to cold object.

3

Points of comparison	Heat conductors	Heat insulators
1. Definition :	They are materials that let heat flow through.	They are materials that don't let heat flow through.
2. Examples :	Iron – copper.	Glass – plastic.
3. One use :	They are used in making cooking pots.	They are used in making handles of cooking pots.

4
[A] 1. It is a form of energy that transfers from the higher temperature object to the lower temperature object.
2. It is the degree of hotness or coldness of a body.

[B] 1. Heat conductors.
2. Copper.
3. Heat insulators.

5
[A] • Observations :
1. You feel hot when touching aluminium and iron rods.
2. You don't feel hot when touching wood and plastic rods.

• Conclusion :
Materials differ in conducting heat.

[B]

Heat conductors	Heat insulators
Iron - Copper - Aluminium - Stainless steel.	Plastic - Air - Wood - Water.

Test yourself 3

1
1. volume - temperature.
2. Celsius thermometer - medical thermometer.
3. zero - 100
4. $10 - \frac{1}{10}$
5. heating - cooling.

2
[A] 1. Because mercury is :
a. A liquid metal that can be seen easily through the thermometer glass.
b. A good conductor of heat.
c. A regular expanding material.
d. Doesn't stick to the wall of the capillary tube.
2. To prevent mercury from going back to the bulb quickly in order to read the measurement easily.
3. Because mercury inside the thermometer is toxic.

[B] 1. (✓) 2. (✓) 3. (✓) 4. (✗)

3
[A] 1. The medical thermometer will be damaged, because the boiling point of water is 100°C
2. The medical thermometer will be broken and mercury which is toxic will harm my body.

[B] 1. b. medical
2. d. (a) and (b).
3. c. (a) and (b).

4
1. Thermometer.
2. Constriction.
3. Ethyl alcohol.
4. Celsius thermometer.
5. 100°C

5
1. ① Constriction. ② Mercury bulb.
③ Capillary tube .
④ Transparent thick glass tube.
2. Celsius thermometer - the temperature of liquids.




3. medical thermometer - the temperature of human body.
4. It prevents the mercury from going back to the bulb quickly in order to read the measurement easily.


[illegible] 2

1
1. thermometers.
2. Celsius thermometer - medical thermometer.
3. Iron - copper - aluminium
4. Wood - plastic - air

2
1. Thermometer.
2. Heat conductors.
3. Heat insulators.

3
- Good conductors of heat :
They are used in making :
- Cooking pans (utensils).
- Kettles (boilers).
- Bad conductors of heat :
They are used in making :
1. The handles of :
- Cooking utensils.
- Electric iron.
- Kettles.
2. Heavy blankets and woolen clothes.

4
1.

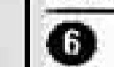
Points of comparison	Celsius thermometer	Medical thermometer
- Structure :	a. Transparent thick glass tube. b. Capillary tube closed from one of its ends. c. Mercury bulb that is filled with mercury and connected to the other end of the capillary tube.	
- Scale :	From 0°C to 100°C	From 35°C to 42°C
- Used liquid :	Mercury.	Mercury.
- Usage :	It is used to measure the temperature of liquids.	It is used to measure the temperature of the human body.

2.

Points of comparison	Good conductors of heat	Bad conductors of heat
Definition :	They are materials that let heat flow through.	They are materials that don't let heat flow through.
Examples :	Copper, aluminium, iron and stainless steel.	Glass, wood, paper, plastic, wool, air, and rubber.
Uses :	They are used in making : - Cooking pans (utensils). - Kettles (boilers).	They are used in making : 1. The handles of : - Cooking utensils. - Electric iron. - Kettles. 2. Heavy blankets and woolen clothes.

5
1. (✗) Celsius thermometer is used .....
2. (✗) The scale of the medical thermometer .....
3. (✗) Plastic is .....
4. (✗) Iron is .....

6
1. Because mercury :
– is a liquid metal.
– is a good conductor of heat.
– is a regular expanding material.
2. Because wood and plastic are bad conductors of heat.
3. Because stainless steel and aluminium are good conductors of heat.
4. To prevent mercury from going back quickly to the bulb in order to read the measurement easily.

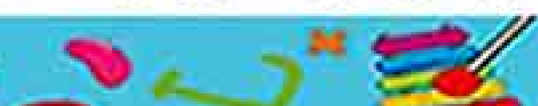

Model Exam 1 on Unit 2

1
1. iron - iron - good
2. plastic - wood.
3. Copper
4. volume - temperature
5. liquid - good









2

[A] 1. Because all metal let heat flow through.

2. Because mercury is :

a. A liquid metal that can be seen easily through the thermometer glass.

b. A good conductor of heat.

c. A regular expanding material.

d. Doesn't stick to the walls of the capillary tube.

3. To prevent mercury from going back quickly to the bulb in order to read the measurement easily.

[B] 1. (✓) 2. (✗)

3

[A] 1. a. a glass of hot tea to a glass of ice.

2. b. iron 3. c. 37°C

4. b. under 5. b. 0°C to 100°C

[B] 1. Fig. (a) : Medical thermometer.

Fig. (b) : Celsius thermometer.

2. The uses of fig. (a) : Used to measure human body temperature.

The uses of fig. (b) : Used to measure liquids temperature.

4

[A] 1. Mercury.

2. Celsius thermometer.

3. Wool.

[B] 1. They are the materials that let heat flow through.

2. It is a form of energy that transfers from the higher temperature object to the lower temperature object.

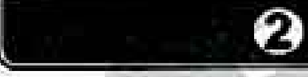
5

[A] 1. We can't hold the handles of cooking pots as aluminium is good conductor of heat.

2. The mercury will return back to the mercury bulb before determining the temperature reading.

3. The medical thermometer will be damaged, because the boiling point of water is 100°C, while the maximum temperature of the medical thermomter is 42°C.

[B] - The main idea of making thermometer is changing the volume of liquid by changing the temperature.



1

1. b. Mercury. 2. d. (a) and (b).

3. c. Stainless steel. 4. b. Ethyl alcohol

5. a. more than

2

[A] 1. To force the mercury back to the mercury bulb.

2. Because the temperature of my hand is higher than that of ice, so heat transfers from my hand to the piece of ice and I feel cold.

3. Because the scale of the medical thermometer ranges from 35°C to 24°C, while the temperature of boiling water is 100°C, so the thermometer will be broken.

[B] 1. (✓) 2. (✗) 3. (✓) 4. (✓)

3

1. hotness – coldness.

2. zero – 100 3. wood – plastic.

4. medical – constriction 5. (– 39) – 357

4

[A] 1. Heat energy will not transfer between the two bodies as they have the same temperature.

2. The mercury will return back quickly to the mercury bulb before determining the temperature reading.

[B] 1. d 2. c 3. a 4. b

5

[A] 1. They are used in making the handles of cooking pots.

2. It is used to measure the temperature of human body.

3. It is used to measure the temperature of liquids.

[B] 1. It is a liquid metal.

2. It is a regular expanding material.

Guide Answers of Test yourself

Test yourself 4

1

1. Atmosphere.

2. manganese dioxide.

3. Downward displacement of water.

4. Photosynthesis process. 5. Catalyst.



2

1. Carbon dioxide – nitrogen

2. Oxygen – combustion.

3. Oxygen – hydrogen peroxide

4. carbon dioxide – nutrients – oxygen gas.

5. $\frac{1}{5}$

3

1. one fifth ($\frac{1}{5}$)

2. Oxygen occupies one fifth (21 %) of the air volume.

3. Because oxygen that exists in the cylinder is consumed during the candle burning, so water replaces oxygen in the cylinder.



4

[A] 1. Because oxygen scarcely (rarely) dissolves in water.

2. Because they help in condensation of water vapour in the air that causes formation of rains or snow.

3. Because it remains without any change in its quantity and properties during the chemical reaction.

[B] 1. oxygen gas.

2. ① Hydrogen peroxide.

② Manganese dioxide.

③ Oxygen gas.

5

[A] 1. b. it consists of oxygen and nitrogen only.

2. b. $\frac{1}{5}$

3. c. hydrogen peroxide.

[B] We cannot control burning processes as oxygen helps in burning.

Test yourself 5



1

1. (✗) Oxygen is heavier than air, so it replaces air.

2. (✓)

3. (✗) ... , but it helps in burning.

4. (✗) ... increases ... 5. (✓)



2

1. burning – oxidation

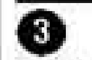
2. cutting – welding.

3. scarcely – downward displacement of water

4. magnesium oxide

5. three oxygen – two oxygen.

6. iron rusting.



3

[A] 1. Oxygen is a colourless, tasteless and odorless gas.

2. Oxygen scarceley dissolves in water.

3. Oxygen is heavier than air, so it replaces air.

[B] 1. The iron cubes will rust.

2. The burning fragment is still burning.

4

[A] 1. Oxidation. 2. Ozone layer.

3. Water.

[B] 1. Oxygen cylinders is used during diving and climbing mountains.

2. Oxygen combines with acetylene gas to produce oxy-acetylene flame which is used in welding and cutting metals.



5

[A] 1. d. (a) and (b).

2. d. acetylene with oxygen.

3. d. one oxygen atom and two hydrogen atoms.

[B] 1. Because it causes corrosion and damage of ironware as the bridges' pillars.

2. Because the ratio of oxygen gas decreases when we rise above the Earth's surface.



1

1. d. photosynthesis process.

2. d. (a) , (b) and (c).

3. b. two oxygen atoms.

4. b. adding dilute hydrochloric acid to calcium carbonate.

5. a. calcium carbonate





2

[A] 1. Due to :
a. Removal of forests.
b. Combustion of big amounts of fuel in factories and means of transport.
2. Because it easily dissolves in water.
3. Due to the formation of calcium carbonate which is insoluble in water that turns clear limewater into milky.

[B] 1. The limewater becomes turbid.
2. Carbon dioxide gas is produced during respiration of plants.

3

1. dilute hydrochloric acid – calcium carbonate
2. upward – heavier
3. Removal of forests – combustion of big amounts of fuel
4. one carbon atom – oxygen atoms.
5. photosynthesis – respiration.

4

1. carbon dioxide gas.
2. carbon dioxide gas
3. ⓐ Dilute hydrochloric acid.
ⓑ Calcium carbonate.
ⓒ Carbon dioxide gas.

5

[A]

Oxygen gas	Carbon dioxide gas
It is prepared by adding hydrogen peroxide to manganese dioxide.	It is prepared by adding dilute hydrochloric acid to calcium carbonate.

[B] 1. (✓)
2. (✗) ... for green plants to build ...

Test yourself 7

1

[A] 1. To produce carbon dioxide gas during fermentation that expanded by heat making bread porous and tasty.
2. Because it is used in :
– Making soft drinks. – Making bread.
– Extinguishing fires.
3. Because it doesn't burn and doesn't help in burning.

[B] magnesium oxide – carbon.

2

[A] 1. d. It scarcely soluble in water.
2. c. It is used in making soft drinks.
3. a. carbon

[B] 1. Global warming.
2. Increasing the temperature of the Earth's atmosphere.

3

1. carbon dioxide – fermentation.
2. liquid – dry ice
3. suffocation of living organisms - global warming.
4. photosynthesis – bread.

4

[A] 1. Carbon dioxide gas evolves.
2. The magnesium ribbon keeps burning for a short time, then extinguishes forming white powder (magnesium oxide) and black substance (carbon).
3. Green plants cannot make photosynthesis process well, so the amount of oxygen will decrease in the air.

[B] 1. It is heavier than air.
2. It doesn't burn and doesn't help in burning.

5

1. (✓) 2. (✗) ... carbon (coal).
3. (✗) ... percentage of carbon dioxide ...
4. (✗) ... doesn't burn and doesn't help in burning.
5. (✓)

Test yourself 8

1

1. b. three oxygen
2. d. calcium hydroxide.
3. d. (a), (b) and (c).
4. b. sodium bicarbonate
5. c. (a) and (b).

2

[A] 1. Because oxygen gas scarcely dissolves in water, while carbon dioxide easily dissolves in water.
2. Because this means that human swallows a big amount of carbon dioxide that causes bone diseases (osteoporosis) and may cause death.

3. Because oxygen gas helps in burning.

[B] 1. Oxygen. 2. Carbon dioxide.

3

1. 21 – 0.03
2. manganese dioxide – calcium carbonate.
3. oxygen – oxygen.
4. oxy-acetylene – welding and cutting of metals.
5. carbon dioxide – black

4

[A] 1. They will rust causing damage to the ironware.
2. Carbon dioxide gas is produced.
3. Carbon dioxide gas is produced during fermentation that makes the bread porous and tasty.

[B] 1. (✗) 2. (✗) 3. (✗) 4. (✓)

5

[A]

Point of comparison	Oxidation	Combustion
Definition :	It is a slow combination (union) between oxygen and element in the presence of moisture (water).	It is a rapid combination (union) between oxygen and element producing heat and light.

[B] 1. It is compressed in iron cylinders to be used in diving.
2. It is used in making soft drinks.

Test yourself 9

1

1. hot copper – carbon dioxide gas
2. Nitrogen
3. nodular bacteria – protein.
4. 78% – 21% 5. Oxygen – nitrogen
6. Nitrogen

2

1. (✗) ... two nitrogen atoms. 2. (✓)
3. (✗) ... to absorb carbon dioxide gas ...
4. (✓)
5. (✗) ... downward displacement of water.

3

1. To remove oxygen gas from air.
2. Because it doesn't help in burning.
3. Because their roots contain nodular bacteria that help legumes to produce protein from the atmospheric nitrogen.

4

1. remove carbon dioxide gas from air.
2. absorb oxygen gas from air.
3. nitrogen gas.
4. ⓐ Concentrated sodium or potassium hydroxide.
ⓑ Hot copper. ⓒ Nitrogen gas.
5. Carbon dioxide gas is not removed from air, so we can't obtain nitrogen gas only.

5

Points of comparison	Nitrogen gas	Oxygen gas
1. Percentage in air :	78% of air volume.	21% of air volume.
2. Preparation :	By passing air over concentrated sodium or potassium hydroxide, then hot copper.	By adding hydrogen peroxide over manganese dioxide as a catalyst.

Test yourself 10

1

1. car tires – lamps.
2. treatment of skin tumors – cooling food.
3. Nitrogen – carbon dioxide
4. stainless steel – gunpowder – electronic devices.

2

1. a. it is easily soluble in water.
2. a. it is important in respiration process.
3. a. Ammonia 4. d. (a), (b) and (c).
5. b. nitrogen

3

[A] 1. Because nitrogen is inactive element.
2. Because nitrogen doesn't help in burning.

[B] 1. It scarcely dissolves in water.

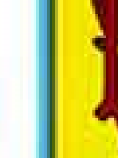
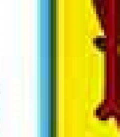


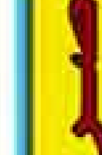


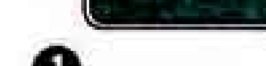










2. It doesn't easily react with a lot of elements as it is inactive element.
3. It is colourless, tasteless and odorless.

4

Points of comparison	Oxygen gas	Nitrogen gas	Carbon dioxide gas
1. Their properties :	– It scarcely dissolves in water.	– It scarcely dissolves in water.	– It easily dissolves in water.
2. Their uses :	– It is used in respiration.	– It is used in making stainless steel.	– It is used in making soft drinks.

5

1. Fig. (b) – Fig. (a)
2. a pungent – ammonia
3. – Nitrogen reacts with a lighted magnesium ribbon producing a white substance that reacts with water producing ammonia gas.



3

1

1. (✗) The nodular bacteria fix nitrogen ....
2. (✗) Nitrogen gas occupies 78% ....

2

1. Because nitrogen is an inactive element.
2. Because clear limewater turbids when carbon dioxide gas passes through it.

3

1. Hydrogen peroxide is decomposed into water and oxygen gas in the presence of manganese dioxide.
2. By burning (combustion) of wood, carbon dioxide gas is produced.

4

1. - Calcium carbonate.
   - Dilute hydrochloric acid.
2. 1. It is used in making bread.
   2. It is used in making soft drinks.
   3. It is used in extinguishing some types of fires.



1 3

1

1. photosynthesis - 21%
2. stainless steel.
3. oxy-acetylene flame.
4. white substance - ammonia.
5. water - oxygen gas.
6. respiration - combustion (burning).

2

[A] 1. Because the consumed oxygen gas during respiration and combustion processes is compensated by the green plants during photosynthesis.
2. Because it causes relative constancy of the volume of car tires when the temperature changes.

[B] 1. (✓) 2. (✗) 3. (✓) 4. (✗)

3

[A] 1. Nitrogen gas.
2. Ozone gas.
3. upward displacement of air.

[B] 1. ① Hydrogen peroxide.
② Manganese dioxide.
③ Oxygen.
2. Because oxygen scarcely dissolves in water.

4

1. b. soil fertilizers. 2. d. carbon dioxide
3. d. (a) , (b) and (c).
4. b. burning. 5. b. Making dry ice.

5

[A] 1. The harmful radiations coming from the Sun will reach the Earth and causes harms to living organisms.
2. This causes osteoporosis (bone disease) and may cause death.

[B] 1. hydrogen. 2. liquefied.
3. carbon dioxide.



2 3

1

1. oxygen - nitrogen
2. oxygen - nitrogen oxide
3. oxygen - nitrogen
4. carbon dioxide gas - oxygen gas.
5. carbon dioxide - nitrogen.

2

[A] 1. Because oxygen combines with iron forming iron oxide that its mass is higher than that of iron.
2. Due to the formation of ammonia gas which has a very pungent smell.
3. Because green plants use carbon dioxide gas in photosynthesis process to produce food and oxygen which is important for respiration of all living organisms.

[B] 1. Oxygen and nitrogen gasses .....
2. ..... is heavier than air.

3

1. Water molecule.
2. Oxy-acetylene flame.
3. Global warming phenomenon.
4. Nitrogen gas. 5. Legumes.

4

[A] 1. Legumes as clover, peas and soybeans can't make proteins.
2. Calcium carbonate is formed which is insoluble in water, so limewater becomes turbid.

[B] 1. Carbon dioxide molecule.
2. Nitrogen gas. 3. Oxygen gas.

5

Nitrogen gas	Carbon dioxide gas	Oxygen gas
78%	0.03%	21%
White - ammonia	White - black	white - magnesium oxide.



Test yourself **11**

1

1. centeral nervous system - peripheral nervous system.
2. fatty – myelin 3. gray - the cerebral cortex.
4. cerebrum - cerebellum - medulla oblongata.
5. the brain

2

[A] 1. Because the skull protects the brain.
2. Because it controls the involuntary processes of the body as heartbeats.
3. To connect the neuron's body with the neighbouring neurons forming synapse.

[B] 1. (✗) 2. (✗) 3. (✓) 4. (✗)

3

[A] 1. They contain the centers of thinking and memory.
2. It keeps the balance of the body during movement.
3. It regulates the involuntary processes in the body as heartbeats.

[B] 1. Neuron. 2. The brain.
3. The two cerebral hemispheres.
4. Axon.

4

[A] 1. It lies at the back area of the brain below the two cerebral hemispheres.
2. At the outer surface of the two cerebral hemispheres.
3. in front of the cerebellum.
4. Inside the skull.

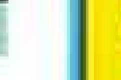
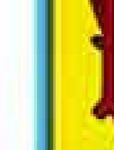
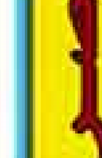
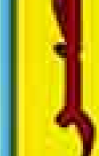
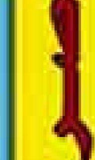
[B] 1. c. Medulla oblongata. 2. d. nervous

5

1. ① Dendrites. ② Nucleus.
③ Cytoplasm. ④ Plasma membrane.
⑤ Myelin sheath. ⑥ Axon terminals.
2. nerve - nervous.
3. They are connected to the neighbouring neurons to form synapse.





Test yourself 12

❶
1. d. (b) and (c). 2. a. H
3. d. Spinal cord.
4. a. two cerebral hemispheres. 5. d. 43

❷
[A] 1. The nervous system will be exhausted and cause nervous tension and affect the heartbeats and the sleeping periods.
2. The withdrawal of your hand will occur quickly.
[B] 1. 12 - 31
2. Loss time sensation – sluggishness.
3. gray - white

❸
[A] 1. It is responsible for the reflex actions inside the body.
2. It delivers the sensory information and the kinetic responses between the central nervous system and all parts of the body.
[B] 1. (✗) 2. (✓) 3. (✗)

❹
[A] 1. To protect the spinal cord.
2. Due to the reflex action made by the spinal cord.
[B] 1. Central nervous system.
2. Brain. 3. Cranial nerves.
4. Spinal nerves. 5. Cerebrum.
6. Medulla oblongata.

❺
[A] 1. Reflex action 2. Spinal cord
3. Peripheral nervous system
[B] 1. the spinal cord
2. ⓐ White matter ⓑ Gray matter
[C] 1. Keeping away from sitting for a long periods in front of computer and television.
2. Staying away from tranquilizers and stimulants.

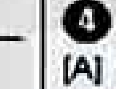
Test yourself 13

❶
1. skull - backbone - ribcage.
2. slightly movable - freely movable
3. axial skeleton - appendicular
4. 12
5. skeletal system - muscular system.

❷
[A] 1. To prevent the friction between vertebrae during motion.
2. To prevent bone diseases such as osteomalacia and rickets.
3. Because the ribcage protects the heart and lungs.
[B] 1. (✓) 2. (✗) 3. (✗) 4. (✓)



❸
[A] 1. It protects the brain.
2. It protects the spinal cord.
3. They allow eating, drinking, writing and holding things.
[B] 1. b 2. a 3. d 4. c



❹
[A]

Points of comparison	Voluntary muscles	Involuntary muscles
1. Definition :	They are the muscles that can move willingly and you can control their movement.	They are the muscles that can move automatically and you can't control their movement.
2. Example :	Face muscles.	Bladder muscles.

[B] 1. femur. 2. vertebral column.
3. knee joint. 4. Ribcage.

❺
[A] 1. bones of lower limbs.
2. ① Femur. ② Shaft bones.
③ Foot bones.
[B] 1. Avoid carrying heavy things that exceed your ability.
2. Exercising regularly.
3. Exposing the body to sunlight for suitable periods.

Guide Answers of Test yourself



4



❶
1. a. nerve cell axon. 2. c. spinal cord.
3. a. two bones. 4. a. Tendons.
5. a. immovable.

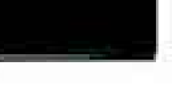
❷
1. Neuron. 2. Spinal cord.
3. Reflex action.
4. Appendicular skeleton.



❸
1. In front of the cerebellum in the brain.
2. Inside the spinal cord.
3. At the back area of the brain below the two cerebral hemispheres.
4. In a channel within a series of vertebrae in the backbone.

❹
1. They fix muscles to bones.
2. It keeps the balance of the body during movement.
3. They allow the movement between bones.
4. - They control the voluntary movements of the body.
- They receive nerve impulses from the sense organs and send the suitable responses to these impulses.
- They contain the centers of thinking and memory.
5. - It protects the heart and the lungs.
- It helps in the inhalation and the exhalation processes.

❺
1. Due to the reflex action made by the spinal cord.
2. Because muscles generate the mechanical energy that moves your body.
3. Because medulla oblongata controls all the involuntary processes such as heartbeats.



1 4

❶
1. Cerebum - Cerebellum - medulla oblongata
2. 33 – spinal cord.
3. gray matter - white matter.
4. 10
5. the central nervous system - the peripheral nervous system.

❷
1. d. (a) , (b) and (c) 2. d. (a) and (c)
3. a. stay away from tranquilizers.
4. b. 12 pairs of cranial nerves and 31 pairs of spinal nerves.
5. b. Spinal cord.

❸
[A] 1. Cerebellum - keeping the balance of the body during movement.
[B] 1. The axon.
2. Slightly movable joints.

❹
1. Fig. (a) : The skeletal system.
Fig. (b) : The muscular system
2. axial – appendicular.
3. It protects the lungs and the heart and helping in inhalation and exhalation processes.
4. the brain
5. humerus, forearm and hand bones

❺
[A] 1. The body can't bend in different directions and there is no protection to the spinal cord.
2. The withdrawal of your hand will occur quickly.
[B] 1. (✗) 2. (✗) 3. (✗)



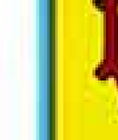
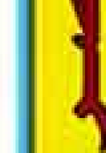





Model Exam 2 on Unit 4

❶
1. The cell body - the axon.
2. 12 - 31



3. the skull - the backbone.
4. cerebral cortex.
5. cartilages - vertebrae.
6. skeletal.

2

[A] 1. All the involuntary processes of the body such as heartbeats will be disturbed and causes death.
2. Muscles are not fixed with bones, so the body cannot move.

[B] 1. Lower limbs in human .....
2. ..... called axon terminals.
3. ..... are involuntary muscles.

3

[A] 1. Due to the reflex action made by the spinal cord.
2. To provent bone diseases such as osteomalacia and rickets.
3. Because it allows the movement in all directions.

[B] 1. – Spinal cord.
– Structure of the brain.
2. – Skull.
– bones of lower limbs.

4

1. Freely movable joints.
2. The brain.
3. Spinal cord.
4. Joints.
5. Medulla oblongata.

5

[A]

Points of comparison	Cranial nerves	Spinal nerves
Definition :	They are nerves that emerge from the brain.	They are nerves that emerge from the spinal cord.
Number :	12 pairs.	31 pairs.

[B] 1. Mumerus.
2. Forearm.
3. Hand.

PART THREE

Guide Answers of Final Exams



1 Cairo Governorate

1 (A) 1. Newton – kilogram (or gram).
2. good. 3. oxygen.
4. white. 5. 12

(B) 1. Due to the formation of calcium carbonate which doesn't dissolve in water.
2. Because the ratio of oxygen gas decreases when we rise above the Earth's surface.

2 (A) 1. Neuron. 2. Mass.
3. The brain. 4. Oxygen gas.
5. Spinal cord.

(B) 1. It is used to measure the weight of objects.
2. It is used to measure the temperature of liquids.
3. It protects the Earth from harmful radiation coming from the Sun.

3 (A) 1. (✗) 2. (✗) 3. (✗)
4. (✗) 5. (✓) 6. (✓)

(B) 1. The nervous system will be exhausted.
2. The temperature of Earth will increase and living organisms will suffocate.

4 (A) 1. c. Water. 2. c. 33
3. a. shoulder. 4. c. 200 gm.
5. c. water & oxygen gas.

(B) ① Mercury bulb.
② Capillary tube.
③ Thick glass tube.

2 Giza Governorate

1 (A) 1. b. wood. 2. b. Nitrogen.
3. b. slightly movable.
4. b. liquid volume.
5. c. 12 6. a. 2 Newton.

(B) 1. Legumes such as clover, peas and soybeans can't produce proteins in the absence of soil bacteria.
2. Limewater turns into milky due to the presence of carbon dioxide in the exhaled air.

2 (A) 1. $\frac{1}{6}$ 2. energy.
3. oxygen. 4. cerebrum.
5. balance. 6. stainless steel.

(B)

Good conductors of heat	Bad conductors of heat
They are materials that let heat flow through.	They are materials that don't let heat flow through.

3 (A) 1. Temperature. 2. Tendons.
3. Neuron. 4. Weight.
5. ozone gas. 6. Thermometer.

(B) 1. Because medulla oblongata controls all the involuntary processes such as heartbeats.
2. Because carbon dioxide doesn't burn and doesn't help in burning.

4 (A) 1. Mass. 2. 42
3. fatty. 4. below.
5. Manganes dioxide.
6. mercury.

(B) 1. dilute hydrochloric acid.
2. calcium carbonate.

3 Alexandria Governorate

1 (A) 1. balance scale – spring scale.
2. The axon – axon terminals.
3. increases – increasing.
4. dilute hydrochloric acid – calcium carbonate.
5. Zero° – 100°

(B) 1. Limewater.
2. Blood vessels muscles.
3. Magnesium oxide.

2 (A) 1. Cerebellum. 2. Temperature.
3. Joints. 4. Nitrogen.

(B) 1. manganese dioxide.
2. nerves. 3. Aluminium.
4. knee.

3 (A) 1. b. 1 kg.
2. c. three similar atoms.
3. b. oxygen.
4. d. the two cerebral hemispheres.

(B) 1. To remove oxygen gas from the atmospheric air by combining with it.
2. To protect the heart and the lungs.
3. Because wood doesn't allow heat to pass through as it is bad conductor of heat.
4. Because the volume of liquids change by changing the temperature as liquids expand by heating and contract by cooling.

4 (A) 1. mercury. 2. capillary tube.
3. constriction – to prevent mercury from going back to the bulb quickly.
4. 35 – 42

(B) 1. 30 kg.
2. Its weight on the Earth = Its mass × 10
= 30 × 10
= 300 Newton.
3. its weight on the moon =
Its weight on the Earth × $\frac{1}{6}$
= 300 × $\frac{1}{6}$ = 50 Newton.

(C)

Axial skeleton	Appendicular skeleton
It consists of the skull, the backbone and the ribcage.	It consists of the bones of the upper limbs and the bones of the lower limbs.

4 Kalyoubia Governorate

1 (A) 1. c. 1. 2. d. glass and wood.
3. a. oxygen.
4. b. Blinking when something gets close to the eye.

(B) 1. To prevent mercury from going back quickly to the mercury bulb in order to read The measurement easily.
2. To prevent bone diseases such as osteomalacia and ricket.
3. To avoid train accidents, where iron is a good conductor of heat that expands and twists by heat.
4. To protect the heart and the lungs.

2 (A) 1. Nervous system.
2. Nitrogen. 3. Joints.
4. Medical thermometer.

(B) 1. It keeps the balance of the body during movement.
2. They fix the muscles with bones.
3. It is used to measure the weight of objects.
4. It protects the Earth from harmful radiation coming from the Sun.

3 (A) 1. A white substance is produced.
2. It causes osteoporosis and may cause death.
3. We can't make handles of cooking pots and also we can't make heavy clothes that keep us warm in winter.
4. Liquefied nitrogen is produced that is used in cooling.

(B)

Points of comparison	Mass	Weight
1. Measuring unit :	Kilogram or gram.	Newton
2. Measuring device :	Balance scale – Sensitive two arms scale – one arm digital scale – one arm scale with a pointer.	Spring scale

4 (A) 1. (✗) 2. (✓) 3. (✗) 4. (✗)

(B) 1. ① Dilute hydrochloric acid.
② Calcium carbonate.
③ Carbon dioxide.
2. It is used in making soft drinks.

5 Sharkia Governorate

1 (A) 1. 12 paris – 31 paris
2. photosynthesis – burning.
3. higher – lower.
4. gravity – weight.
5. The brain – skull.

(B) 1. To avoid train accidents, where iron is good conductor of heat that expands and twists by heat.
2. Because it protect the Earth from harmful radiation coming from the Sun.

2 (A) 1. Atmospheric air. 2. Heat insulators.
3. Tendons. 4. Carbon dioxide.
5. Neuron.






(B) 1. a. It is good conductor of heat.
b. It is a regular expanding material.
2. ①. Cell body.
② Myelin sheath.
③ Axon terminals.

③ (A) 1. It dissociates in the presence of manganese dioxide into oxygen gas and water.
2. It is used to measure the weight of objects.
3. It is used to measure the temperature of liquids.

(B) 1. b. thigh. 2. b. temperature.
3. c. copper. 4. c. 12
5. c. O_2

④ (A) 1. carbon dioxide.
2. medical thermometer.
3. increases.
4. Medulla oblongata.
5. lifeless gas.

(B) 1. Weight on Earth = Mass × 10
= 6 × 10 = 60 Newton.
2. Weight on moon = weight on Earth × $\frac{1}{6}$
= 60 × $\frac{1}{6}$ = 10 Newton.

6 Menofia Governorate

① (A) 1. d. Spring. 2. d. mercury.
3. c. Copper. 4. d. knee.
5. d. Plastic.
6. a. Calcium carbonate.

(B) 1. This causes osteoporosis and may cause death.
2. Train accidents will occur.

② (A) 1. Newton.
2. Oxy-acetylene flame.
3. Temperature. 4. Nitrogen.
5. Global warming.
6. Medulla oblongata.

(B) 1. Its mass on the Earth = 30 kg.
2. Its weight on the Earth = Its Mass × 10
= 30 × 10 = 300 Newton
3. Its weight on the moon
= It weight on Earth × $\frac{1}{6}$
= 300 × $\frac{1}{6}$ = 50 Newton.

③ (A) 1. gray. 2. mercury.
3. Carbon dioxide. 4. cerebrum.
5. oxygen. 6. decreases

(B) 1. Neuron.
2. ①. Dendrites. ② Cytoplasm.
③ Axon.

④ (A) 1. heat conductors – heat insulators.
2. (– 39°C) – (357°C)
3. pressure – cooling
4. 12 – 31
5. burning – oxidation.
6. spinal cord – keeping the balance of the body during movement.

(B) 1. To prevent the leakage of heat.
2. Because it causes relative constancy of the volume of car tires when the temperature changes.

7 Gharbia Governorate

① (A) 1. 35 – 42
2. the brainal – the spinal cord.
3. volume – temperature.
4. oxygen – carbon dioxide.
5. balance scale – spring scale.

(B) 1. Because they are good conductors of heat.
2. Because nitrogen is an inactive element.
3. Due to removal of forests and burning large amount of fuel.

② (A) 1. Ozone gas.
2. Celsius thermometer.
3. Appendicular skeleton.
4. Heat energy.
5. Acetylene gas.

(B) 1. Weight on Earth = mass × 10
= 30 × 10 = 300 Newton.
2. Weight on moon = Weight on Earth × $\frac{1}{6}$
= 300 × $\frac{1}{6}$ = 50 Newton.
3. Its mass on the moon = 30 kg.

③ (A) 1. c. sleepless.
2. a. carbon dioxide.
3. c. 71 Newton.
4. b. gives limited extent to measure temperature.
5. a. magnesium oxide and coal.

(B) 1. It causes poisoning to the person as mercury is a toxic substance.
2. The withdrawal of your hand will occur quickly.
3. Train accidents will occur.

④ (A) 1. Cerebellum. 2. Nitrogen gas.
3. two. 4. iron.
5. calcium carbonate.

(B) ① Cell body. ② Axon.
③ Axon terminals.

8 Dakahlia Governorate

① (A) 1. thermometer.
2. the brain – the spinal cord.
3. hydrogen peroxide.
4. 5 kg. 5. fractures

(B) 1. It is used to measure the temperature of liquids.
2. It is used in refrigeration (cooling).
3. It removes oxygen gas from atmospheric air by combining with it.

② (A) 1. Mass.
2. Involuntary muscles.
3. Carbon dioxide.
4. Medulla oblongata.
5. Oxygen gas.

(B) 1. Because it is good conductor of heat.
2. To prevent friction between bones (vertebrae) during movement.
3. Because it causes relative constancy of the volume of car tires when the temperature changes.

③ (A) 1. d. mercury. 2. d. spinal cord.
3. a. scarcely. 4. d. 1 Newton.
5. b. calcium carbonate.

(B) 1. Nitrogen oxide will produce.
2. Mercury will return back quickly to the bulb and we can't read the measurement correctly.
3. The body can't move.

④ 1. (✓) 2. (✗) 3. (✗)
4. (✓) 5. (✓) 6. (✗)

(B) 1. Stay away from addiction.
2. Doing physical exercises.

9 Ismailia Governorate

① (A) 1. b. 100 2. d. skull joints.
3. b. burning. 4. c. Copper.
5. c. nitrogen.

(B) 1. The mass of rock = 300 gm
= $\frac{300}{1000}$ = 0.3 kg.
2. The weight of the rock
= mass (kg.) × 10 = 0.3 × 10 = 3 Newton
3. By changing the place, the mass of the rock will not change while its weight will change.

② (A) 1. (✗) 2. (✓) 3. (✗)
4. (✓) 5. (✗) 6. (✗)

(B) 1. Magnesium ribbon keeps burning for a short time producing magnesium oxide which is a white substance and carbon which is a black substance.
2. The withdrawal of your hand will occur quickly.

③ (A) 1. Involuntary muscles.
2. Heat insulators.
3. Oxy-acetylene flame.
4. The brain.

(B) 1. It produces carbon dioxide during fermentation which makes bread porous and tasty.
2. It protect the Earth from harmful radiation that come from the Sun.

(C) 1. Medical thermometer.
2. ① Capillary tube.
② Transparent thick glass tube.
③ Constriction.

④ (A) 1. balance – spring
2. green plants – photosynthesis.
3. energy – high.
4. tendons – cartilages
5. 12 pairs – 31 pairs

(B) 1. To keep our bodies warm because woolen clothes are bad conductors of heat.
2. To protect them from rusting.
3. To keep the nervous system healthy.




10 Suez Governorate

1 (A) 1. good. 2. place. 3. energy.
4. 0.03 % – CO_2
5. cerebellum – medulla oblongata.
6. 33

2 (A) 1. (×) 2. (×) 3. (×)
4. (×) 5. (✓) 6. (×)

(B) 1. Because this increases the percentage of carbon dioxide gas.
2. Because aluminium is a good conductor of heat, while plastic is a bad conductor of heat.

3 (A) 1. a. oxygen. 2. b. 1 Newton.
3. c. 12 4. b. cerebellum.
5. b. oxygen and water.
6. b. O_2

(B) The weight on the Earth = mass × 10
= 10 × 10 = 100 Newton

4 (A) 1. Medical thermometer.
2. ① Mercury bulb.
② Constriction.
③ Capillary tube.

(B) 1. different rates.
2. Carbon dioxide.
3. three. 4. Tendons.

11 Port Said Governorate

1 (A) 1. weight – Newton.
2. bad – handles of cooking pots.
3. nitrogen – oxygen
4. 35 – 10 parts
5. Skull – backbone.
6. Carbon dioxide – calcium carbonate.

(B) Medical thermometer only has a constriction to prevent mercury from going back quickly to the bulb, so we can read the measurement easily.

2 (A) 1. Mercury. 2. Ozone.
3. volume. 4. cerebrum.

(B) 1. Weight on Earth = Mass × 10
300 = Mass × 10
Mass = $\frac{300}{10}$ = 30 kg.

2. Weight on Moon = $\frac{1}{6}$ × Weight on Earth
= $\frac{1}{6}$ × 300 = 50 Newton

(C) 1. Due to the formation of ammonia gas which has a pungent smell.
2. To prevent friction between vertebrae (bones) during motion.

3 (A) 1. b. fertilizers. 2. a. decrease.
3. c. trunk.
4. a. heavier than air.

(B)

Points of comparison	Cranial nerves	Spinal nerves
The place where they emerge from :	They emerge from the brain.	They emerge from the spinal cord.
Their numbers :	12 pairs.	31 pairs.

(C) 1. The mass of the cleansing wire will increases, because it combines with oxygen.
2. We can't hold the kettle, because copper is a good conductor of heat.

4 (A) 1. Carbon dioxide gas. 2. Temperature.
3. Joints. 4. Oxygen gas.

(B) It is used to measure the mass of objects.

(C) 1. ① Cell body. ② Nucleus.
③ Dendrites. ④ Axon.
2. neuron.

12 Damietta Governorate

1 (A) 1. Celsius thermometer – medical thermometer
2. oxygen – hydrogen.
3. axial skeleton – appendicular skeleton.
4. balance scale – Newton.

(B) 1. The knee joint ...
2. ... its weight on moon's surface is 10 Newton.
3. Copper conducts heat faster than aluminium and iron.
4. ... by absorbing the ultraviolet radiation ...

2 (A) 1. c. glass and wood.
2. c. Daniel Rutherford.
3. a. spinal Nerves.
4. a. calcium carbonate.
5. c. the spring scale.
6. a. Tendons.

(B) 1. The nervous system will be harmed as they lead to nervous tension and affect the heartbeats.
2. The temperature of the Earth will increase and living organisms will suffocate.

3 (A) 1. Mass. 2. Reflex action.
3. Oxygen.
4. Involuntary muscles.
5. Temperature.
6. Oxy-acetylene flame.

(B) 1. neuron.
2. ① Axon. ② Nucleus.
③ Dendrites.

4 (A) 1. Because wood and plastic are bad conductors of heat, while aluminium is good conductor of heat.
2. Because potassium hydroxide absorbs carbon dioxide from air, while the hot copper remove oxygen from the air.
3. Because the gravity of a planet depends on its mass, so the weight of any object will change from a planet to another.

(B) 1. It prevents mercury from going back to the bulb quickly, so we can read the measurement easily.
2. They contain the centers of thinking and memory.

13 Kafr El-Sheikh Governorate

1 (A) 1. Carbon dioxide gas.
2. Mass.
3. Appendicular skeleton.
4. Temperature.

(B) 1. spring scale – weight of objects.
2. ribcage (ribs) – protect the heart and the lungs.

(C) 1. It acts as a catalyst during preparation of oxygen.
2. It keeps the balance of the body during movement.

2 (A) 1. c. calcium hydroxide.
2. c. blinking when something gets close to the eye.
3. a. volume.
4. b. 100 gm.

(B) 1. Because oxygen scarcely dissolves in water.
2. Because wood and plastic are bad conductors of heat.

(C)

Points of comparison	Immovable joints	Freely movable joints
Definition :	They are the joints that don't allow any movement.	They are the joints that allow movement in all directions.
Example :	Joints between the bones of the skull.	Shoulder joint

3 (A) 1. fissure – nerve fibres.
2. nitrogen gas – azote.
3. muscle. 4. 35 – 42 5. weight.

(B) 1. mercury. 2. three.
3. Cartilages.
4. calcium carbonate.

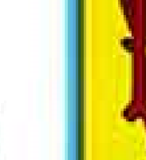
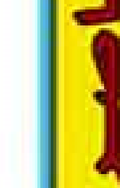
4 (A) 1. b 2. c 3. a
(B) 1. (✓) 2. (×) 3. (×)
(C) 1. Neuron.
2. ① Axon terminals. ② Axon.

14 Beheira Governorate

1 (A) 1. hydrogen peroxide – manganese dioxide.
2. 33 – 31
3. Celsius thermometer – medical thermometer.
4. the brain – the skull.
5. 0°C – 100 °C





(B)

Points of comparison	Mass	Weight
Definition :	The amount of matter in an object.	The gravitational force by which a body is attracted to the Earth.
Effect of different places :	Constant.	Variable.
Direction :	It has no effect	Its effect is always towards the centre of the Earth.

2 (A) 1. Spinal cord. 2. Nitrogen gas.
3. Temperature.
4. Carbon dioxide gas.
5. Tendons. 6. Heat insulators.

(B) 1. It is used in welding and cutting metals.
2. It prevent mercury to return back quickly to the mercury bulb, so we can read the measurement easily.

3 (A) 1. b. carbon.
2. a. nerve cell axon. 3. c. Copper.
4. b. Nitrogen. 5. b. 100

(B) 1. Because it gives relative constancy to the volume of car tires when the temperature changes.
2. To prevent bone diseases such as osteomalacia and rickets.
3. Due to the formation of calcium carbonate which is insoluble in water.

4 (A) 1. Carbon dioxide is produced during fermentation, so the bread becomes porous and tasty.
2. Protein substance that builds up the bodies of all living organisms is not formed.
3. The weight of the body will decrease.

(B) 1. – It is good conductor of heat.
– It is a regular expanding material.
– It doesn't stick to the walls of the capillary tube.
– It is a liquid metal that can be seen easily through the thermometer glass.
2. – Doing physical exercises.
– Stay away from addiction.
– Stay away from sources of pollution.
3. ① Femur. ② Shaft bones.
③ Foot bones.

15 Fayoum Governorate

1 (A) 1. kilogram (or gram) – Newton.
2. the brain – skull.
3. green plants – photosynthesis.

(B) 1. It protects the heart and the lungs.
2. It is used in welding and cutting metals.

2 (A) 1. b. Copper. 2. c. Elbow.
3. b. 1 Newton. 4. b. Nitrogen.
5. d. cerebellum.

(B) 1. Iron will combine with oxygen in the presence of water, so iron will rust.
2. The nervous system will be exhausted as they lead to nervous tension and affect the heartbeats and the sleeping periods.

3 (A) 1. The mass. 2. fatty.
3. mercury.
4. manganese dioxide. 5. 12 pairs.

(B) 1. Because nitrogen scarcely dissolves in water.
2. To prevent mercury to return back quickly to the bulb, so we can read the measurement easily.

4 (A) 1. Weight. 2. Ozone gas.
3. Heat insulators. 4. Nitrogen gas.
5. Spinal cord.

(B) 1. – Calcium carbonate.
– Dilute hydrochloric acid.
2. ① It is used in making soft drinks.
② It is used in extinguishing fires.

16 Beni-Suef Governorate

1 (A) 1. pressure – cooling.
2. mass – spring.
3. hotness – coldness.
4. cell body – axon.

2 (A) 1. Because it controls all the involuntary processes such as heartbeats.
2. Because yeast produces carbon dioxide during fermentation, that expands by heat making the bread porous and tasty.
3. Because these muscles work automatically and you can't control their movement.
4. Because it causes relative constancy of the volume of car tires when the temperature changes.

3 (A) 1. c. air. 2. a. 4 kg.
3. a. slightly movable.
4. a. – 39 : 357

(B) 1. Reflex action. 2. Tendons.
3. Mercury. 4. Weight.

4 (A) ① Cerebrum. ② Cerebellum.
③ Medulla oblongata.
④ To keep the balance of the body during movement.

(B)

Points of comparison	Oxidation	Burning
1. Definition :	It is a slow combination (union) between oxygen and element in the presence of moisture (water)	It is a rapid combination (union) between oxygen and element producing heat and light.
2. Example :	Iron rusting	Burning a piece of cleansing wire

17 El-Minia Governorate

1 1. balance scale – Newton.
2. 78 % – 21 %
3. 31 pairs.
4. spring scale.
5. hydrogen peroxide – manganese dioxide.

2 1. Joints. 2. Oxygen gas.
3. Medical thermometer.
4. Mass.

3 (A) 1. A white substance will produce.
2. Limewater turns milky due to the formation of calcium carbonate which is insoluble in water.

(B) 1. Because aluminium is good conductor of heat, while plastic and wood are bad conductors of heat.
2. Because it protects the Earth from harmful radiation coming from the Sun.
3. Because it controls all the involuntary processes such as heartbeats.

4 (A) 1. carbon dioxide.
2. calcium carbonate.
3. dilute hydrochloric acid.

(B) 1. Weight on Earth = mass × 10
= 30 × 10 = 300 Newton
2. Weight on Moon = Weight on Earth × $\frac{1}{6}$
= 300 × $\frac{1}{6}$ = 50 Newton.

(C) 1. (×) 2. (✓) 3. (✓)

18 Assiut Governorate

1 1. Newton – kilogram (or gram).
2. Nitrogen – oxygen.
3. the brain – skull. 4. energy. 5. 12

2 (A) 1. a. Earth. 2. b. iron.
3. c. all the previous.
4. c. carbon dioxide.
5. b. 100 Newton. 6. a. 21 %

(B) 1. They allow the movement between bones.
2. It protects the Earth from harmful radiation that come from the Sun.

3 (A) 1. Carbon dioxide. 2. Tendons.
3. Mass.
4. Celsius thermometer.

(B) 1. b 2. a 3. e 4. c

4 (A) ① White matter. ② Gray matter.

(B) 1. Because aluminium allow the flow of heat through as it is a good conductor of heat.
2. Because it causes relative constancy of the volume of car tires when the temperature changes.

(C) 1. Iron will combine with oxygen in the presence of water, so the iron nail will rust.
2. The mercury will return back quickly to the bulb before determining the temperature reading.

19 Sohag Governorate

❶ (A) 1. a. Elbow. 2. a. 50.
3. c. carbon. 4. d. plastic.
5. c. fertilizers.

(B) 1. Iron will combine with oxygen in the presence of water, so iron will rust.
2. The nervous system will be exhausted as they lead to nervous tension and affect the heartbeats and sleeping periods.
3. Mercury will return back quickly to the mercury bulb and we can't read the temperature correctly.

❷ (A) 1. Hydrogen peroxide.
2. Spring scale. 3. Reflex action.
4. Heat conductors. 5. Nitrogen gas.

(B) 1. – dilute hydrochloric acid.
– calcium carbonate.
2. Carbon dioxide gas is collected by upward displacement of air because it is heavier than air and easily dissolves in water.

❸ (A) 1. bone. 2. Nitrogen. 3. 31 – 12
4. measure the temperature of human body – measure the temperature of liquids.

(B) 1. Weight on Earth = Mass × 10
= 12 × 10 = 120 Newton.
2. Weight on Moon = Weight on Earth × $\frac{1}{6}$
= 120 × $\frac{1}{6}$ = 20 Newton.

❹ (A) 1. To protect the heart and the lungs.
2. Because it protects the Earth from harmful radiation coming from the Sun.
3. Because the gravity of a planet depends on its mass, so the weight of any object will change from a planet to another.
4. To prevent the leakage of heat as air is bad conductor of heat.

(B) 1. blood vessels muscles.
2. oxygen. 3. Copper.
4. cerebrum.

20 Qena Governorate

❶ (A) 1. hydrogen peroxide – manganese dioxide.
2. the place. 3. Celsius.
4. central nervous system – peripheral nervous system.

(B) 1. It is used in welding and cutting metals.
2. They prevent friction between vertebrae during movement.

❷ (A) 1. (×) 2. (×) 3. (✓)
4. (✓) 5. (✓)

(B) 1. To prevent mercury from going back quickly to the mercury bulb, so we can read the temperature easily.
2. Because carbon dioxide doesn't burn and doesn't help in burning.
3. Because it controls all the involuntary processes such as heartbeats.

❸ (A) 1. b. copper. 2. b. 100
3. c. 12 pairs. 4. c. nitrogen.
5. a. spring scale.

(B) 1. Mass on the Moon = 30 kg.
2. Weight on Earth = Mass × 10
= 30 × 10 = 300 Newton.
3. Weight on Moon = $\frac{1}{6}$ × Weight on Earth
= $\frac{1}{6}$ × 300 = 50 Newton

❹ (A) 1. Spinal cord. 2. Heat energy.
3. Carbon dioxide gas.
4. Heat conductors. 5. Mass.

(B) ① Femur. ② Shaft bones.
③ Foot bones.

21 Luxor Governorate

❶ 1. 35 – 42
2. Backbone – cartilages
3. gravity – weight
4. the brain – skull.

❷ (A) 1. Involuntary muscles.
2. Nitrogen. 3. Spinal cord.
4. Ozone gas.
5. Appendicular skeleton.
6. Mercury.

(B) 1. Because oxygen scarcely dissolves in water.
2. Because it controls the involuntary processes such as heartbeats.

❸ (A) 1. (×) 2. (✓) 3. (×) 4. (×)

(B) 1. c. iron. 2. b. slightly movable.
3. a. fertilizers. 4. a. oxygen.

❹ (A) 1. The mass on the moon's surface = 30 kg.
2. The weight on the Earth's surface
= Its Mass × 10 = 30 × 10
= 300 Newton

(B) 1. carbon dioxide gas.
2. ① Dilute hydrochloric acid.
② Calcium carbonate.
③ Carbon dioxide gas

22 Aswan Governorate

❶ (A) 1. 35 – 42
2. carbon dioxide – oxygen.
3. wood – plastic.
4. the skull – the ribcage
– the backbone
5. place.

(B) 1. It is used in welding and cutting metals
2. It prevent friction between bones during movement.

❷ (A) 1. c. 100
2. a. carbon.
3. b. Copper.
4. c. gives limited extent to measure temperature.
5. d. spinal cord.

(B) 1. Because it protects the Earth from harmful radiation coming from the Sun.
2. Because it controls all the involuntary processes such as heartbeats.

❸ (A) 1. Heat conductors.
2. Weight. 3. Tendons.
4. Nitrogen gas. 5. Reflex action.

(B) 1. Iron will combine with oxygen in the presence of water, so the iron nail will rust.
2. The nervous system will be exhausted.

❹ 1. (✓) 2. (×) 3. (✓)
4. (✓) 5. (×)

(B) 1. – calcium carbonate.
– dilute hydrochloric acid.
2. It is used in making soft drinks.

23 New Vallay Governorate

❶ (A) 1. a body is attracted.
2. Oxygen.
3. Celsius.
4. Nitrogen.

(B) 1. It is used in cutting and welding metals.
2. It is used to measure the weight of objects.
3. It removes oxygen from atmospheric air by combining with it.
4. It protects the Earth from harmful radiation coming from the Sun.

❷ (A) 1. c. shaft. 2. a. increases.
3. c. mercury. 4. b. 31 pairs.

(B) It causes :
– nervous tension.
– sleepless.

(C) 1. To protect them from rusting.
2. Because carbon dioxide doesn't burn and doesn't help in burning.

❸ (A) 1. (✓) 2. (✓) 3. (×)
4. (✓) 5. (✓)

(B) 1. Limewater turbids due to the formation of calcium carbonate.
2. Train accidents will occur.
3. A white substance is produced which reacts with water forming ammonia gas.

❹ (A)

Points of comparison	Voluntary muscles	Involuntary muscles
Definition :	They are the muscles that can move willingly and you can control its movement.	They are the muscles that can move automatically and you can't control or even aware of their movement
Example :	– Face muscles.	– Blood vessels muscles.

(B) 1. Weight on Earth = Mass × 10
300 = Mass × 10
Mass = $\frac{300}{10}$ = 30 kg.
2. Weight on Moon = $\frac{1}{6}$ × Weight on Earth
= $\frac{1}{6}$ × 300 = 50 Newton

(C) 1. ① Transparent thick glass tube.
② Mercury bulb.
③ Capillary tube.
2. 1. measuring the temperature of human body.
2. 35 – 42

24 South Sinai Governorate

❶ (A) 1. 35 – 42 2. oxygen.
3. 78 4. plastic – wood

(B) 1. To protect the heart and the lungs.
2. Because oxygen scarcely dissolves in water.

(C)

Points of comparison	Mass	Weight
Device :	Balance scale.	Spring scale.
Unit :	Kilogram (or gram).	Newton.

❷ (A) 1. (✗) ... faster than iron.
2. (✓)
3. (✗) Nitrogen gas ...
4. (✗) The mass is constant ...

(B) 1. They are used in making cooking pots.
2. They are used in making handles of cooking pots.

(C) 1. Celsius thermometer.
2. It is used to measure the temperature of liquids.
3. Mercury.

❸ (A) 1. a. 2 kg. 2. c. oxygen. 3. b. glass.
4. d. carbon dioxide.

(B) 1. The withdrawal of your hand will occur.
2. The temperature of the Earth will increase and living organisms will suffocate.

(C) 1. They prevent friction between vertebrae (bones) during motion.
2. It is used in making fertilizers.

❹ (A) 1. Weight.
2. Carbon dioxide gas.
3. Backbone. 4. Oxygen gas.

(B) 1. e 2. d 3. a 4. c

25 North Sinai Governorate

❶ (A) 1. 33 2. the brain
3. Celsius thermometer.
4. The mass of body.
5. 78 6. oxygen.

(B) 1. Because carbon dioxide gas doesn't burn and doesn't help in burning.
2. Because aluminium allow the heat to flow through as it is a good conductor of heat.

❷ (A) 1. Mass. 2. Ozone gas.
3. Joints. 4. Spinal cord.
5. Nitrogen. 6. Carbon dioxide.

(B) 1. It is the degree of hotness or coldness of a body.
2. They are materials that don't let heat flow through.

❸ (A) 1. b. oxygen. 2. b. thigh.
3. d. two cerebral hemispheres.
4. c. 100 5. b. fertilizers.
6. b. copper.

(B) 1. It is used to measure the weight of an object.
2. It protects the heart and the lungs.

❹ (A) 1. b 2. d 3. a 4. e 5. f 6. c

(B) 1. Iron will combine with oxygen in the presence of water, so the iron nail will rust.
2. The nervoues system will be harmed as they lead to nervous tension and affect the heartbeats and the sleeping periods.

26 Red Sea Governorate

❶ (A) 1. kilogram (or gram)
2. 35 – 42 3. 12
4. respiration – burning

(B) 1. It is used to measure the weight of objects.
2. It is responsible for the reflex action.

❷ (A) 1. b. thigh. 2. c. nitrogen.
3. c. copper. 4. b. cerebellum.
5. c. glass and wood.
6. a. oxygen.

(B) 1. The temperature of the Earth will increase and living organisms will suffocate.
2. The nervous system will be exhausted as they lead to nervous tension and affect the heartbeats.

❸ (A) 1. Weight on Earth = Mass × 10
= 30 × 10 = 300 Newton
2. Weight on Moon = Weight on Earth × $\frac{1}{6}$
= 300 × $\frac{1}{6}$ = 50 Newton

(B) 1. Heat conductors.
2. Carbon dioxide gas.
3. Celsius thermometer.
4. Tendons. 5. Neuron.
6. Atmospheric air.

❹ (A) 1. mercury. 2. Oxygen.
3. 33 vertebra.
4. photosynthesis process.
5. three. 6. plastic.

(B) 1. To prevent mercury from going back quickly to the bulb, so we can read the measurement easily.
2. Because the Earth has greater mass and gravitational force than the Moon.

27 Matrouh Governorate

❶ (A) 1. energy.
2. kilogram (or gram) – Newton.
3. The brain.
4. 21 – 78

(B) 1. It protects the heart and the lungs.
2. It is used in welding and cutting metals.

❷ (A) 1. b. copper. 2. a. 15 kg.
3. b. nitrogen. 4. b. Wood.

(B) 1. Because it causes relative constancy of the volume of car tires when the temperature changes.
2. Because it protects the Earth from harmful radiation coming from the Sun.
3. Because it is good conductor of heat and it is a regular expanding material.

❸ (A) 1. Carbon dioxide.
2. Nitrogen gas. 3. Spinal cord.
4. Reflex action. 5. Heat conductors.

(B) 1. Weight on Earth = Mass × 10
190 = Mass × 10
Mass = $\frac{190}{10}$ = 19 kg.

❹ (A) 1. (✗) ... is 12 pairs.
2. (✗) three oxygen otoms.
3. (✗) ... from the hot object to the cold object.
4. (✗) ... slightly movable joint.

(B) ① Dendrites. ② Axon.
③ Axon terminals. ④ neuron